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Instruction Manual

Tri-Clover® Flo-Diversion Valve and Panel Models 762-227, 762-227MRAL & 862W-227

Effective 8/1/03

CONTENTS

Thank you for purchasing an Alfa Laval Product!

This manual contains installation, operation, and repair instructions, with parts lists, for the Model 762-227, 762-227 MRAL and 862W-227 Flo-Diversion Valves and control panels designed and manufactured by Alfa Laval Inc.. It also provides a trouble shooting chart to assist in determining electrical and mechanical malfunctions, if they should occur.

READ THIS MANUAL carefully to learn how to service and reconfigure these valves**.** Failure to do so could result in personal injury or equipment damage.

SAFETY
IMPORTANT SAFETY INFORMATION 3

INTRODUCTION
GENERAL 4

INSTALLATION
UNPACKING AND INSTALLING EQUIPMENT 7
PRESTARTING 9
CLEANING 16

MAINTENANCE
INTRODUCTION 17
DISASSEMBLY 17
VALVE COMPONENT INSPECTION 18
CONTROL TOP DISASSEMBLY 19
ACTUATOR BUSHING / PACKING REPLACEMENT 20
CONTROL TOP ASSEMBLY 21
VALVE ASSEMBLY 23
..... 23

TROUBLESHOOTING
TROUBLESHOOTING GUIDELINES 25

PARTS LIST
CONTROL PANEL COMPONENTS 28
PANEL 29
74-115-X-Y CONTROL HOUSING 30
762-227M 32
862W-227 34
762-227MRAL 36

ALLEN BRADLEY SLC 500 PLC
TRI-CLOVER PANEL MODELS 48-2762-1 AND 48-2762-2 38
SOFTWARE VERSION NUMBERS (AS OF 8/4/94) 41
MEMOREY MODULES 42
FIXED HARDWARE STYLE 42
INPUT AND OUTPUT STATUS INDICATORS 43
FLO-DIVERSION PANEL #48-2762-1 WITHOUT SOLENOIDS 45
WIRING DIAGRAM FOR FLO-DIVERSION PANEL #48-2762-1 47
EXTERNAL WIRING DIAGRAM FOR FLO-DIVERSION PANEL 48-2762-1 49
WIRING DIAGRAM FOR FLO-DIVERSION PANEL #48-2762-2 53

SAFETY

IMPORTANT SAFETY INFORMATION

Safety is very important!

DO NOT attempt to modify any Alfa Laval product. To do so could create unsafe conditions and void all warranties. ***DO NOT place any Alfa Laval product in an application where general product service ratings are exceeded.***

The following DANGER, WARNING, AND CAUTION signs and their meanings are used within these instructions.

⚠ DANGER

Indicates an imminently hazardous situation which, if not avoided, ***will*** result in death or serious injury. The word Danger is used in the most extreme cases.

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, ***may*** result in minor or moderate injury. May also be used to alert against an unsafe operating or maintenance practice.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, ***could*** result in death or serious injury.

Part Number 38-294

Part Number 38-228

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INTRODUCTION

GENERAL

PURPOSE OF THE EQUIPMENT

The Flo-Diversion Valve is used primarily in the dairy industry for controlling the direction of product flow during the pasteurization process. It is positioned in the product stream at the discharge of the holding tube and will not forward the product until a safe pasteurization temperature is reached.

The Flo-Diversion Valve is operated in conjunction with HTST Controllers or Safety Thermal Limit Recorder Controllers.

DESCRIPTION

The Flo-Diversion Valves consist of a set of valves. The valves, a divert valve and a leak detector valve, each contain an actuator, a body, and a valve plug assembly. The valve actuator is air operated in one direction and spring operated in the other direction. Air, under pressure, is introduced into the actuator, forcing the piston downward. When air pressure is removed, a spring returns the piston to its normal position.

The valve plug assembly is screwed to the actuator stem, and moves up and down in the valve body as air pressure is applied and released. Inert rubber plugs on the valve stem seat in the valve bodies and seal the appropriate ports in the valve bodies.

The actuator also mechanically operates a microswitch which is mounted at the top of the actuator in a housing. The microswitch engages a bump on the actuator indicating nut, and opens or closes an electrical circuit to the controller as the actuator stem moves up or down.

The purpose of the 762-227 MRAL Reverse Acting Flo-Diversion Valve is to eliminate hydraulic shock in systems where the differential pressure across the valve is 30 psig or greater. The design of the valve allows closing against the process flow rather than with the flow as conventional valves do. The valve is mounted horizontally and is still able to drain due to tangential valve bodies. Two piece stems allow for assembling and disassembling the valve. The two stems are joined together with a nut and an o-ring seal. During o-ring failure leakage flows through leak detect holes in the short stem and can be seen through the clear plastic stem guard.

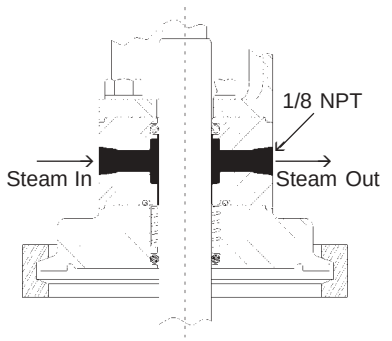
MODEL 862W-227M, ASEPTIC FLO-DIVERSION VALVE

The 862W-227M is a modified version of the standard upright 762-227M Flo-Diversion Valve.

The modification consists of the addition of a sterile barrier spacer or collar and extended stem on each valve. The collars mount between the standard valve's yoke and upper bodies.

The collar allows you to pipe steam or other sterile media into the chamber area which surrounds the upper portion of the valve stems.

A fluoroelastomer seat style combines with a high temperature bushing, both of which are engineered to withstand the high temperatures encountered in aseptic processing applications.



Cross-section drawing illustrating the path of steam through the steam collar.

Figure 1: Flo-Diversion Valve

INTRODUCTION

The control panel contains a three position selector switch for operating the valve in product flow, cleaning, or inspection positions. A manual diversion push button allows the operator to divert product flow into the balance tank at any time during operation of the equipment. Inside the control panel are solenoid valves, timers and relays required for control of the valves. The solenoid valve are electrically energized, and control air flow to the divert and leak detect valves. A pneumatic timing relay (CRT2) delays valve operation until the timing pump is completely stopped when the selector switch is turned to the “inspect” or “clean” positions from the product position. Pneumatic timing relay (CRT1) delays the leak detector valve from assuming forward flow until a time delay has elapsed, this time delay is started at the same time the divert valve moves to forward flow. Cam Timer (CTI) controls the sequencing of the valves during the CIP (Clean-in-Place) operation. The Model 48-2120-E-(voltage) Control Panel includes a 10 minute timer to delay valve cycling for the 10 minute delay time period. A terminal strip provides for connecting external electrical wiring, and also is used for trouble shooting the electrical system. An air filter-regulator mounted on the side of the control panel governs air pressure and filters the air to the solenoid valves.

A programmable logic controller panel is also available and is described later in this manual.

PRINCIPLES OF OPERATION

The Flo-Diversion Valve is operated by a HTST controller or a Safety Thermal Limit Recorder Controller to direct product flow either to the raw product tank (balance tank) for reprocessing, or to continue processing through the HTST unit.

PRODUCT POSITION

At the beginning of a cycle the timing pump is started, and the selector switch on the valve control panel is set in the “product” position. The selector switch is interlocked with the timing pump switch to prevent accidental forwarding of unsafe product, if the selector switch is inadvertently moved either to the “clean” or "inspect” position.

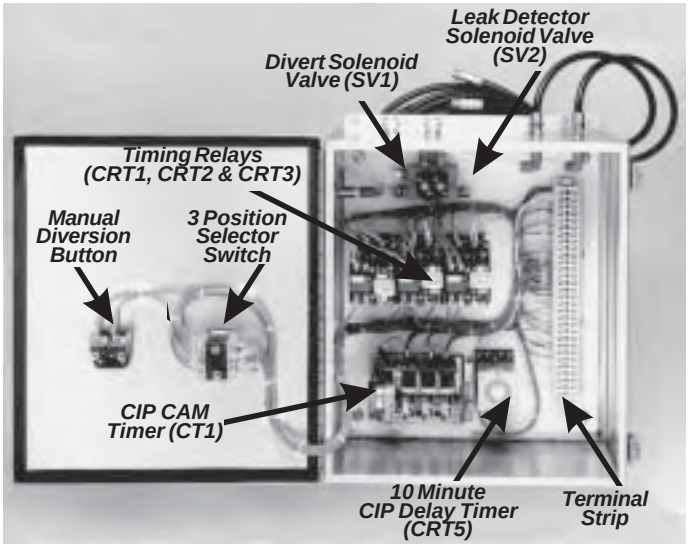

Leak Detector Solenoid Valve (SV2)
Divert Solenoid Valve (SV1)
Timing Relays (CRT1, CRT2 & CRT3)
Manual Diversion Button
3 Position Selector Switch
CIP CAM Timer (CT1)
10 Minute CIP Delay Timer (CRT5)
Terminal Strip

Figure 2: Control Panel

INTRODUCTION

The product is circulated through the regenerator and heater, and into the holding tube and Flo-Diversion Valve. The valve diverts product back to the balance tank until a safe pasteurization temperature is reached. When legal temperature is reached, the temperature limit switch closes the circuit to the solenoid valve (SVl) for the divert valve. The solenoid valve allows air to flow into the divert valve actuator, placing the valve in the forward flow position. The product then flows through the leak detect port for the predetermined length of time set on timer (CRT1). When the delay time has elapsed, solenoid valve (SV2) for the leak detect valve is energized, allowing air to flow to the leak detect valve actuator, placing it in the forward flow position. The valves will maintain the forward flow position until:

1. The pasteurization temperature becomes sub-legal
2. The selector switch is moved from the ‘’product" position
3. The manual diversion switch is activated
4. An electrical, mechanical malfunction or air failure occurs

During the time the divert valve is diverting product to the balance tank, the valve plug sealing the forward flow port in the divert valve body is being tested for leakage.

If leakage past the plug occurs, product is channeled out the leak detect port to atmosphere or to the balance tank, depending on piping arrangement.

The position of the valves is indicated by red and green lights on the controller. The circuit for the lights is opened and closed by the microswitches (MSl and MS2) on the divert valve and leak detector valve actuators. When the valve is in the “divert flow” position, the rollers on the microswitches arms engage the indicating nut on the actuator stems and the circuit to the red light is closed. When the divert and leak detector valve moves from the divert flow position, the rollers disengage from the indicating nut, opening the circuit to the red light and divert valve only closes the circuit to the green light.

The timing pump will not operate unless the selector switch is in “product” position and the timing pump circuit is complete.

CLEAN POSITION

The Flo-Diversion Valve is automatically cleaned in place. When the selector switch is placed in the “clean” position, the valves are sequentially activated while cleaning solution is circulated through the system. The recycling cam timer (CT1) activates switches which open and close circuits to the solenoid valves on a timed basis. The divert, leak detect, and forward flow ports and valve plugs are thoroughly flushed on each cycle of the timer. The selector switch is interlocked with the timing pump in this position to prevent forwarding of unsafe product.

INSPECT POSITION

The “inspect” position of the selector switch, sets the valves in forward flow position to permit dismantling of the valves for inspection and/or repair. The selector switch is interlocked with the timing pump in this position to prevent forwarding of unsafe product.

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INSTALLATION

UNPACKING AND INSTALLING EQUIPMENT

UNPACKING EQUIPMENT

The Flo-Diversion Valve should be unpacked immediately upon receipt from the factory and carefully inspected for damage that may have occurred during shipping. The equipment should also be checked against the bill of lading to make sure there are no shortages. Any damage or shortage should be immediately reported to the carrier.

LOCATION OF EQUIPMENT

The valves are mounted directly into the product line, and in close proximity to the press and balance tank. Care should be taken, however, to locate the valves in a place where they are easily reached for maintenance and disassembly.

The control panel should be located near the valves, and positioned so it can be easily reached for changing the selector switch position, manual diversion, when necessary, and for service of the electrical components if malfunctions should occur.

Easy access to the valve and panel is necessary for operator and regulatory agency testing. If valves are not accessible from the floor an appropriate fixed platform may be required by state and federal regulators.

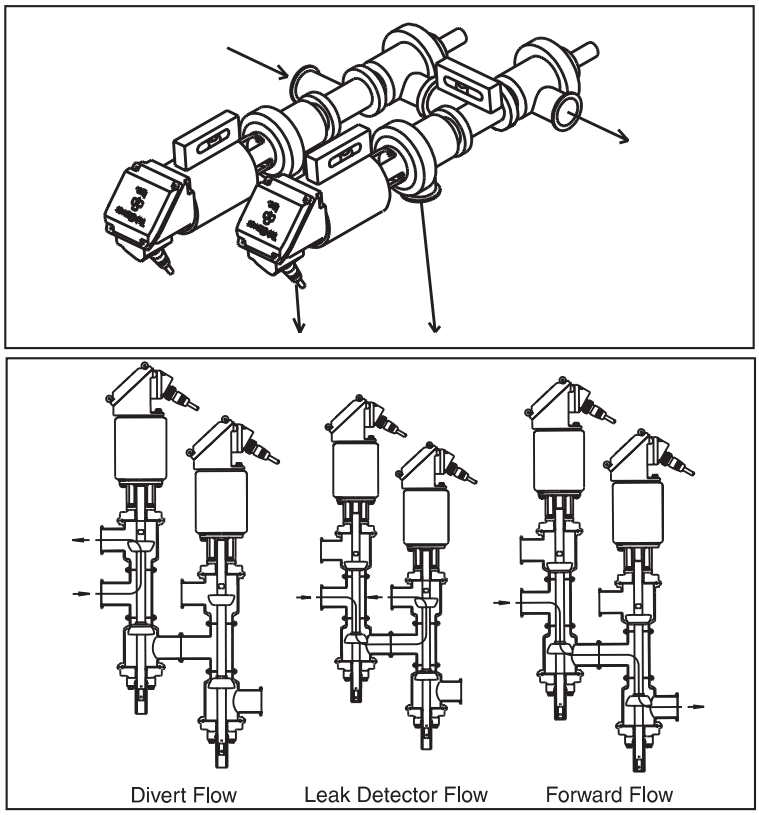

Figure 3: Reverse-Acting Flo-Diversion Valve

INSTALLATION

INSTALLING THE EQUIPMENT

Secure the valves to an adequate support using appropriate pipe hangers, and connect the valves to the product piping. The valves are furnished with Tri-Clamp® fittings for simplified connections. Make sure the piping is self supporting and that the joints at the valves are properly aligned to prevent strain on the valves.

Mount the control panel on a rigid support using the holes provided in the control box. Avoid mounting the unit on a support that may be subjected to excessive vibration.

AIR SUPPLY

Connect a clean dry air supply to the filter regulator mounted on the side of the control panel. All air connections should be made with ¼" OD copper tubing or equivalent. Black or galvanized pipe is not recommended. Before making final connections blow out all air lines to remove scale, metal filings or other extraneous particles.

Connect the air lines on the control panel to the divert valve and leak detect valve, making sure that the air lines are connected to the proper valves. Quick couplers are not acceptable as air connection joints.

Pressure/Capacity Limits

862W-227M & 762-227M Series Standard FDV			
Valve Model/Size	**Maximum Product Pressure (PSI)**	**Maximum Capacity (GPM)**	**Air Supply Pressure (PSI)**
762-227M-1½"	100*	60	70
762-227M-2"	100*	95	70
762-227M-2½"	100*	175	70
762-227M-3"	50*	215	70
762-227M-3H"	100*	215	60

762-227M Series Reverse Acting FDV			
Valve Model/Size	**Maximum Product Pressure (PSI)****	**Maximum Capacity (GPM)**	**Air Supply Pressure (PSI)**
762-227MRA-2"	100	200	70
762-227MRA-2½"	80	350	70
762-227MRA-3"	70	500	80
762-227MRA-4"	40	950	90

* Maximum differential pressure not to exceed 30psi.
** Product pressure can be increased with the reduction of capacity. Please contact Tri-Clover if higher limits are required.

ELECTRICAL CONNECTIONS

All the main electrical wiring with the exception of the microswitch wiring is brought into the control panel through a hole punched in the control unit at the time of installation. The microswitch wiring is brought into the control unit through holes at the top of the control panel. A terminal board located inside the control unit provides the necessary connecting points for the wiring. Refer to wiring diagrams and schematic diagrams on previous pages.

Before connecting power to the control panel, make certain the voltage and frequency agree with the valves on the data plate.

INSTALLATION

PRESTARTING

PRESTART TESTS

Before putting the Flo-Diversion Valve into operation it is necessary to check the installation. To make sure that all parts of the system are functioning properly, the following checklist should be used.

1. Air Supply. Make sure all air line connections are tight and free of leaks. Before turning on the air supply, loosen the adjusting screw on top of the Filter-Regulator until an compression on the spring is released. Turn on the air supply and turn the adjusting screw in until the pressure guage registers the air pressure indicated on the data plate.
2. Electrical Wiring. Check the wiring against the schematic included with the control panel to make sure wiring is complete and all connections are tight. Cheek the voltage ratings on all components to be sure that they are compatible.
3 Mechanical.

   A. Turn the controller on, but do not turn the timing pump on. Turn the selector switch on the control panel to the “Clean” position. The cam timer (CTl) in the control panel should start rotating. The divert valve will move to the forward flow position in approximately thirty-five seconds, and the leak detector valve will move to forward flow approximately twenty seconds after the divert valve has been positioned. If the panel also contains a ten minute CIP delay timer, the timer will time out after ten minutes, then the cam timer will start and operate as described above. Cam timer will make one revolution every four minutes. Turn the selector switch to the “product” position. The timer will continue to rotate for as long as four minutes until the homing cam returns to the start position. The homing cam is the cam on the left side of the timer. The valves will both return immediately to the divert position. Move the selector switch to the “inspect” position. The valves will assume the forward flow position.

   B. Place the selector switch in the “product” position, and turn on the timing pump. Cam timer should be in the “home” position to continue these tests. The red indicating light on the STLR Controller should be on. Set the temperature control to “pasteurize” setting. When pasteurizing temperature is reached, the divert valve will assume the forward flow position. The leak detector valve will be delayed in closing, the time interval depending on the setting of timer (CRTl). The green indicator light should come on and the red indicator light go off when the divert valve assumes the forward flow position. If the lights do not function properly, check for microswitch adjustment. See topic “Adjustments.” Reducing the temperature to sub-legal should cause both valves to assume the divert position until temperature is raised to the pasteurization level at which time the valves will again operate in the product cycle.

   C. Change the selector switch setting from "product" to "clean" while pasteurization temperature is being maintained, and the timing pump is on. The valves should immediately assume the divert position and the timing pump should stop. In 35 seconds, the divert valve should assume forward flow position and twenty seconds later the leak detector valve will go into the forward position.

   D. With the timing pump On, and the product at pasteurization temperature, place the selector switch in the "product" position. when full forward flow is reached, move the selector switch to the "inspect" position. The valves should immediately assume the divert position and the timing pump should shut off. After fifteen seconds, or when the timing pump stops running, the valves should assume the forward flow position, with the timing pump remaining off.

      Note: For installations using the Slick 500, if the Timing Pump Run Down Time exceeds the pre-programmed time of the UV PROM, a new chip will be requried with the matching setting before the panel is sealed.

   E. When the product is below legal pasteurization temperature and the timing pump is on, move the selector switch from "product" position to "clean" position. The timing pump will shut off and the valves will follow the cleaning cycle after a delay of ten minutes (CRT5).

F. With sub-legal pasteurazation temperature and the timing pump on, move the selector switch from "product" to "inspect" position. The timing pump will shut off and the valves will assume forward flow fifteen seconds after switch is positioned.

G. At pasteurization temperatures, press the manual divert button while selector switch is in the "product" position. The valves will assume the divert position, and will remain in this position until the manual diversion switch is released. When the switch is released, the valves will follow the normal "product" cycle.

4. MICROSWITCH TEST for 762-227 & 862W-227. The microswitches in the valves are safety devices. They are adjusted so that the timing pump will not run at sub-legal pasteurization temperatures, unless the valves are completely and properly assembled. To test the microswitch and adjustment, follow the instructions below.

A. Make certain the valves are properly assembled, paying particular attention to the actuator mounting bolts, yoke mounting bolts, body clamps, and the valve stem to actuator stem connection.

B. Make sure the temperature sensing element of the Safety Thermal Limit Recorder Controller is below legal pasteurization temperature.

C. Momentarily turn on the timing pump to make sure it is operating properly, and then turn it off.

D. Leak Dectect valve - Remove the valve body clamp and the upper valve body port clamp on the valve. Lift the valve off the lower body. Turn the selector switch to the "Inspect" postiion. (After time delay, valve will switch position.) Unscrew the valve stem off the actuator stem enough to insert the gap hauge between the two stems. Tighten the valve stem onto the gauge.

E. Turn the selector switch to the “PRODUCT” position and the timing pump will not start.

F. Remove the gap gauge and reassemble the valve. Ensure the valve is properly and completely assembled.

G. Divert Valve - Remove the lower body from the valve. Turn the selector switch to the "Inspect"" position. (After time delay, valve will switch position.) Unscrew the valve stem off the actuator stem enough to insert the gap gauge between the two stems. Tighten the valve stem onto the gauge as shown in Figure 4.

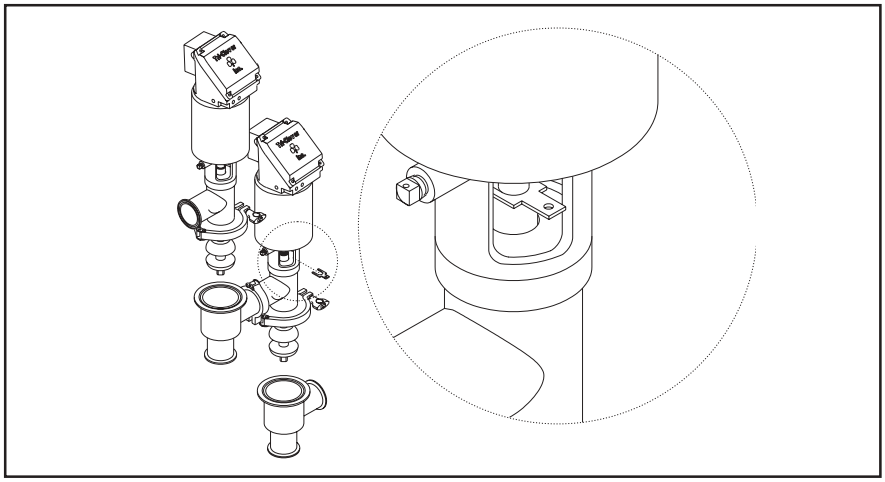

Figure 4: 762-227 Gauge Placement

H. Turn the selector switch to the “PRODUCT” position and the timing pump will not start.

I. Remove the gap gauge and reassemble the valve. Ensure the valve is properly and completely assembled.

ALTERNATE TEST METHOD CAN ALSO BE USED TO TEST THE MICROSWITCH ADJUSTMENT.

Note: These are unofficial test methods for troubleshooting purposes only.

A. Turn off the air supply to the valves.

B. Place the temperature sensing element of the Safety Thermal Limit Recorder Controller in water that is above legal pasteurization temperature.

C. Slowly adjust the filter regulator to admit air to the valve actuator. When valve stem moves down $^{1}/_{16}$", the red light should go out for both valves and the green light comes on when the divert valve is tested. If the valves do not meet either of these tests. the microswitch must be adjusted. Refer to topic “ADJUSTMENTS”.

4. MICROSWITCH TEST for 762-227MRAL. The microswitches in the valve are safety devices. They are adjusted so that the timing pump will not run, at sub-legal pasteurization temperatures, unless the valves are completely and properly assembled. To test the microswitch adjustment:

A. Make certain the valves are properly assembled, paying particular attention to the actuator mounting bolts, yoke mounting bolts, body clamps, and the valve stem to actuator stem connection. Ensure that the nylon locking pin is in place on the actuator shaft threads. The pin should be replaced each time the stems are decoupled.

B. Make sure the temperature sensing element of the Safety Thermal Limit Recorder Controller is below legal pasteurization temperature.

C. Momentarily turn on the timing pump to make sure it is operating properly, and then turn it off.

D. Switch the valve to the forward flow position by selecting the inspect position on the panel (Note: After time delay valve will switch position.)

E. Remove the tri-clamp that attaches the bonnet / clear plastic stem guard assembly. Slide the assembly off the stem.

F. Unscrew the nut at the end of the exposed stem for stem removal.

G. Slide the stem and o-ring off the stem connected to the actuator.

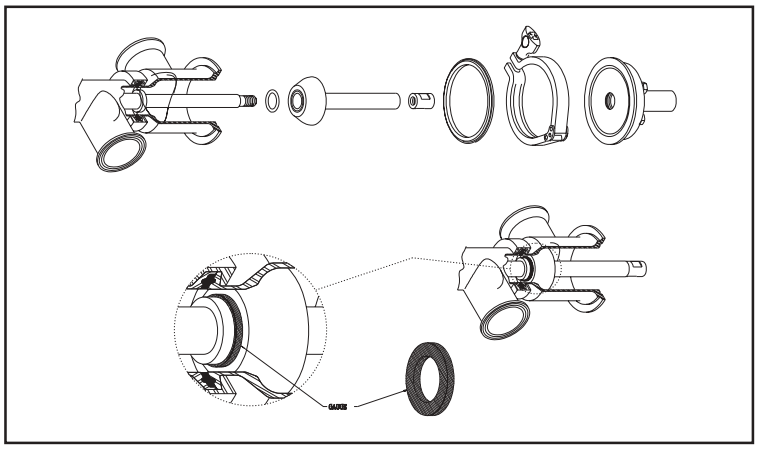

Figure 5: 762-227MRAL Gauge Placement

H. Slide the gauge (stored inside control housing) onto the stem connected to the actuator. Reassemble the two stems together without the o-ring and tighten the nut to secure the gauge between the two stems. See Figure 4.

I. Apply required air to the actuator for normal operating conditions.

ACTUATOR AIR PRESSURE REQUIREMENTS

VALVE SIZE	PSIG
2	70
$2^1/_2$	70
3	70

J. Turn the selector switch to the “Product” position and the timing pump will not start.

K. Remove the gauge and reassemble the valve. Ensure valve is properly and completely assembled.

L. Repeat steps D - L with the divert valve.

AN ALTERNATE TEST METHOD CAN ALSO BE USED TO TEST THE MICROSWITCH ADJUSTMENT.

Note: These are unofficial test methods for troubleshooting purposes only.

A. Turn off the air supply to the valves.

B. Place the temperature sensing element of the Safety Thermal Limit Recorder Controller in water that is above legal pasteurization temperature.

C. Slowly adjust the filter regulator to admit air to the valve actuator. When valve stem moves down 1/16", the red light should go out for both valves and the green light comes on when the divert valve is tested. If the valves do not meet either of these tests, the microswitch must be adjusted. Refer to topic “Adjustments”.

5. MICROSWITCH ADJUSTMENT for 762-227 & 862W-227. The Flo-Diversion Valve is precision equipment, and has been carefully manufactured and adjusted before leaving the factory. As is the case with most precision machinery however, the adjustments may have been disturbed during shipping or installation. There are three adjustments that can be made. The microswitch adjustment is most critical because of the switch function in controlling the timing pump and indicating lights. The other two adjustments are on the timers used to sequence the valves during the cleaning cycle, and the time delay between opening of the divert valve to forward flow and the opening of the leak detector valve to forward flow position.

Follow the microswitch adjustment instructions below for the leak detect valve and then begin again with step “A” for the divert valve.

A. Check the valve to make sure it is properly and completely assembled.

⚠ CAUTION

Turn off electrical power to the valve and shut off air supply.

B Remove the valve body clamp and the upper valve port clamp on the leak detect valve. This will allow access to the valve stem when the valve is lifted off the lower body. The divert valve requires removal of the lower body for access to the valve stem.

C Apply air to the actuator to move the stem off the upper seat. Loosen, by unscrewing, the valve stem enough to insert the gap gauge between the actuator stem and the valve stem. Tighten the valve stem onto the gauge. Remove air from the actuator.

D. Remove the four screws that secure the green control housing cover and remove the cover.

E. Loosen the microswitch mounting screws just enough to move the switches. Position the microswitches by starting with the switch above the indicating nut. Move the switch down until the roller on the switch is just below the flat on the indicating nut and deactivates the switch. Tighten microswitch mounting screws.

F. Remove the gap gauge by applying air to the actuator and loosening the valve stem. Then tighten the valve stem to the actuator stem. remove air to the actuator. the microswitch should be positioned in the activated positioned.

G. Secure the green switch housing cover with the four mounting screws. Reassemble the valve to the valve body and to the process line.

H. Turn the power on and test the mircroswitch as described in the topic "Microswitch Test."

G. Unscrew the nut at the end of the exposed stem for stem removal.

H. Slide the stem and o-ring off the stem connected to the actuator.

5. MICROSWITCH ADJUSTMENT for 762-227MARL. The Flo-Diversion Valve is precision equipment, and has been carefully manufactured and adjusted before leaving the factory. As is the case with most precision machinery however, the adjustments may have been disturbed during shipping or installation. There are three adjustments that can be made. The microswitch adjustment is most critical because of the switch function in controlling the timing pump and indicating lights. The other two adjustments are on the timers used to sequence the valves during the cleaning cycle, and the time delay between opening of the divert valve to forward flow and the opening of the leak detector valve to forward flow position.

A. Check the valve to ensure it is properly and completely assembled.

⚠ CAUTION

Switch the valve to the forward flow position. This will allow removal of one of the valve stems.

B. Switch the valve to the forward flow position by turning the selector switch on the panel to the "inspect" position. This will allow removal of one of the valve stems.

C. Remove the four screws that secure the green control housing cover and remove the cover.

D. Remove the Tri-clamp that attaches the bonnet / clear plastic stem guard assembly.

E. Slide the bonnet / stem guard assembly off the stem.

F. Unscrew the nut at the end of the exposed stem for stem removal.

G. Slide the stem and o-ring off the stem connected to the actuator.

H. Slide the gauge (stored inside control housing) onto the stem connected to the actuator. Reassemble the two stem together without the o-ring and tighten the nut to secure the gauge between the two stems.

I. Position the valve in the divert flow position.

J. Loosen the switch mounting screws just enough to allow adjustment of the switch assembly. Begin adjustment with the switch roller on the indicating nut flat. Slide the switch assembly down until the switch becomes deactivated. Tighten the mounting screws.

L. Replace the gauge with the o-ring. Tighten the nut to secure the two stems together. Slide the bonnet / stem guard assembly onto the stem and secure with the tri-clamp.

M. Place the gauge in the vacant switch tracks of the control housing. Secure the green switch cover with the four mounting screws.

CIP CAM TIMER (CTL) ADJUSTMENT

The CIP timer is comprised of a drive motor, a camshaft with three sets of cams which are adjustable, and three switches which are activated by the cams. The timer motor drives the camshaft at $^{1}/_{4}$ RPM. The adjustable cam can be set to engage the rollers for any portion of a revolution. The adjustable cam is set on a percentage of on - off time, that is, if the cam is set for forty-five seconds off time, the percentage of off time is 20%. The cams are from left to right: the homing cam: the divert valve cam: and, the leak detect valve cam. The purpose and settings for these cams are as follows:

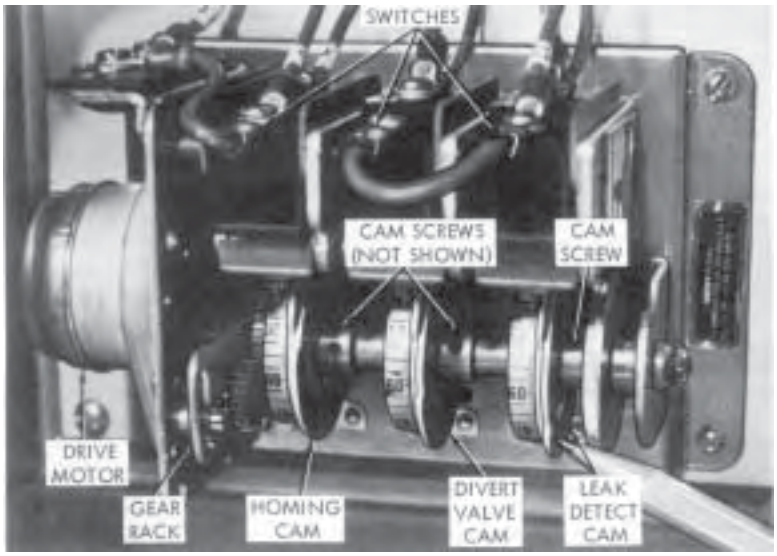

Figure 6: CIP Timer Adjustments

Homing Cam

This cam and its associated circuitry is used to return the timer to its starting position if the selector switch moved from the clean position. The homing cam switch is wired to the timer drive motor. This permits the timer motor to keep driving the cam shaft until the homing cam switch is opened by the dip in the cam. The normal setting for this cam is one second or less.

Divert Valve Cam

This cam and its circuitry controls the divert valve opening and closing during the cleaning cycle. The switch is wired into the circuit for solenoid valve (SV1) When the switch is activated by the cam, the solenoid is energized allowing air into to the divert valve actuator. The normal setting for this cam is forty seconds or 16% of off time.

Leak Detect Valve Cam

This cam and its circuitry controls the leak detect valve opening and closing during the cleaning cycle. The switch is wired into the circuit for solenoid valve (SV2), with operation the same as the divert valve. The normal setting for this cam is one minute or 25% of off time.

Timer (CRT1)

The (CRT1) timer controls the time delay of the leak detect valve following the divert valve assuming forward flow. This delay is necessary to prevent possible forwarding of unsafe product. The timer is adjustable from 0-30 seconds. The time delay is adjusted by turning the wheel to the right to decrease the time and to the left to increase the time. The time delay can be tested by depressing the button on the relay and measuring the time required for it to release. The normally closed contacts are delayed in closing when delay is de-energized. Set at one to five seconds.

Time Delay Relay (CRT2)

This relay is energized when the selector switch is placed in the “product” position. It delays valve operation until the timing pump is completely stopped. The time delay is adjusted by turning the wheel to the right to decrease the time and to the left to increase the time. The time delay can be tested by depressing the button and measuring the time required for it to release. The normally closed contacts are delayed in closing when relay is de-energized. Set at fifteen seconds or until the pump runs down.

Time Delay Relay (CRT3)

This relay is energized when the timing pump circuit is completed. The relay is an off delay timer that maintains the timing pump starter while the STLR Controller is diverting the valves. This allows the use of pushbuttons from remote starting locations. Set at one second maximum.

Timer (CRT5)

This timer is energized when the selector switch is placed in the clean position. It delays CIP valve sequencing for ten minutes and keeps the system in diverted flow. When the timer has timed out the CIP timer cycles as described above. Set at ten minutes.

MAINTENANCE

CLEANING

The Flo-Diversion Valve is used in the food processing industry and therefore is subject to frequent cleaning. The clean-in-place (CIP) capability permits cleaning of the process passages and the components that come in contact with the product, without dismantling the valve. The entire cleaning process is accomplished automatically once the selector switch has been placed in the “clean’’ position. The cleaning fluid is introduced into the system and follows the same flow pattern as the process liquid. The cam timer (CT1) in the control unit is programmed to sequentially energize the solenoid valves supplying air to the valve actuators.

The valves are completely flushed in the divert, leak detect and forward flow positions each time the timer makes a complete revolution. The cleaning cycle will be repeated until the selector switch is moved off the clean position.

The cleaning cycle timer (CT1) is based on four minute revolution of the timer cams. The cams are preset at the factory to produce a forty second flush of the divert valve and piping, a twenty second flush of the leak detect port, and a three minute flush of the product line. If longer or shorter flush cycles are desired, refer to topic Timer Adjustment.

MAINTENANCE

INTRODUCTION

The Flo-Diversion Valve has been designed to provide many years of trouble-free service with a minimum amount of maintenance. The only maintenance required other than periodic inspection of the valves and occasional replacement of worn or faulty components, is keeping the air supply to the valves constant, and clean. This is accomplished by daily opening the drain valve on the air filter, thus allowing the air system to purge itself of water, oil, and other dirt. Also blow out the receivers on the air compressor periodically. Refer to the applicable instructions supplied with the compressor.

Inspection of the valve components should be accomplished on a regularly scheduled basis, to assure maximum efficiency of the Flo-Diversion Valve. Refer to topic Disassembly for the necessary disassembly procedures.

DISASSEMBLY

⚠ WARNING

To prevent personal injury, relieve pipe line pressure and drain all fluid completely before servicing.

This section describes complete disassembly of the valves, actuators and the control unit. Although complete disassembly is covered, it is only intended as a guide. The valves, actuators and control unit should be disassembled to the extent necessary for inspection or needed repair.

762-227 & 862W-227 VALVE DISASSEMBLY

1. Be sure the timing pump is turned off. Remove the lower body line clamps on the divert valve and the upper body outlet line clamp from the leak detect valve.
2. Remove divert valve body clamp and separate the lower body from the upper body.
3. Remove leak detect body clamp and separate the upper valve assembly from the lower valve body.
4. Move selector switch on the control unit to the “inspect” position to extend valve stems for removal.
5. After the valves have assumed the inspect position unscrew the valve stems from the actuator stems.
6. Disconnect electrical power to the control housing and shut off air supply to the valves.
7. Separate upper valve body from yoke by removing three bolts. Remove split bushing, sleeve and o-ring from upper body.
8. Separate yoke from actuator by removing four bolts. Remove green bushing retainer and o-ring between yoke and actuator.

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MAINTENANCE

762-227MRAL VALVE DISASSEMBLY

1. Be sure the timing pump is turned off. Remove the four tri-clamps that connect the valve to the process system. To separate the Flo-Diversion Valve into two valves remove the tri-clamp that connects the valves together.
2. Remove Tri-clamp and separate the bonnet / end cap assembly from the valve body. Remove the four screws and washers to separate the bonnet from the end cap. Pull the clear plastic stem guard out of the end cap.
3. Remove o-ring from the end cap and the o-ring and bushing from the bonnet.
4. Apply air to actuator for stem removal. Unscrew the stem nut and remove the stem and o-ring.
5. Remove air to the actuator.
6. Remove the clamp that connects the actuator, bonnet, yoke and stem assembly to the valve body.
7. Unscrew the stem from the actuator shaft.
8. Separate bonnet from yoke by removing three bolts. Remove bushing and o-ring from valve bonnet.
9. Separate yoke from actuator by removing four bolts. Remove green bushing retainer and o-ring between yoke and actuator.
10. Remove the two clamps and gaskets to separate the remaining valve body assembly.

VALVE COMPONENT INSPECTION

Valve Body Seats

Inspect for nicks and scratches and other signs of excessive wear. Leakage past the seats may result from these types of irregularities.

Valve Stem & Seats

Inspect rubber or PTFE seats for signs of cracking, tearing, checking, or excessive wear. Note: Refer to TR-Seat Replacement Section for installation of TR Seats. Inspect stem finish for galling, nicks, or scratches. Leakage may result from these irregularities.

Split Bushing

Inspect for signs of cracks, nicks, scratches or excessive wear on inside diameter. A worn bushing will not properly align valve stem.

O-Rings

Inspect for cuts, abrasions, flat spots, or other damage that would cause leakage of ineffective

MAINTENANCE

CONTROL TOP DISASSEMBLY

cleaning.

⚠ WARNING

To prevent personal injury, disconnect all electrical and pneumatic power to the control top. Hazardous voltage can cause electrical shock. The actuator stem moves with extreme force and suddenness.

1. Disconnect the Cable. Unscrew the knurled ring of the cable counter clockwise. After the threads disengage, pull the cable off of the connector.
2. Remove The Rear Cover. Remove the 4 cover screws and o-rings located in the screw hole counter bores. Remove the electrical connector. Remove each of the wires from the male pins of the connector. Grasp each wire at the base of its terminal connection. Use of needle nose pliers is recommended. Take care not to damage the wire insulation or crimp the terminal. Remove the electrical connector nut by turning counter clockwise. Push the electrical connector through the hole in the rear cover. Remove the rubber electrical connector gasket. Remove the rear cover gasket.
3. Remove the Front Cover. Loosen the four cover screws until they disengage their mounting holes in the base. Remove the cover gasket.
4. Remove the switches. Remove both white wire harness connectors from the switches. Pull the wires of the harness through the access hole on the base. Loosen the switch mounting screws by 2 turns. Slide the switches and their black mounting blocks completely from the guide tracks in the base.
5. Remove the solenoid.

   NOTE: Not every control top contains a solenoid. Continue to the next step if no solenoid is present. Pull the two solenoid wires through the access hole. Remove the two mounting screws fastening the solenoid. Remove the solenoid and triangular selector block located under the solenoid.
6. Remove the control top base from the actuator. Remove all the air line connections from the base. Remove the three screws from inside the base, and the one bolt outside the base located below the rear cover. Pull the base straight up and away from the actuator.

   NOTE: The green bearing retainer might remain attached to the base. It will come out of its counter bore in the base when it hits the activating nut. Be aware that a small amount of impact is required to dislodge it from the base.

MAINTENANCE

ACTUATOR BUSHING / PACKING REPLACEMENT

⚠ WARNING

To prevent personal injury, do not attempt to cut actuator open. The actuator spring is compressed and under load.

Bushings guide the actuator stem while packings provide sealing around the stem. The bushing and packing should both be replaced if one or the other fails. Even if only one end fails both ends of the actuator should be serviced. Disconnect and remove actuator completely from valve before proceeding with the steps below, see VALVE DISASSEMBLY and CONTROL TOP DISASSEMBLY.

1. Attach the indicating nut to the actuator stem with the retaining rings on the Control Top end and screw on a $^{5}/_{8}$ nut to the actuator stem threaded end.
2. Apply 60 PSIG to the unthreaded air holes in the actuator end caps to blow out the packings and bushings. The nuts on the actuator stem will prevent the bushing form flying off the end of the actuator stem.
3. Remove air supply once the bushing and packing are forced out.
4. Wipe stem clean. Lubricate new packing with Tri- clover C137 lubricant.
5. Slide new packing over the stem with the “V” side facing the actuator. Partially insert packing into smallest counter bore using a flat tool to assist the outer lip. DO NOT DAMAGE OF ROLL THE PACKING LIP DURING INSTALLATION.
6. Place bushing on top of the packing. Push on the bushing until outer flange is flush with actuator.

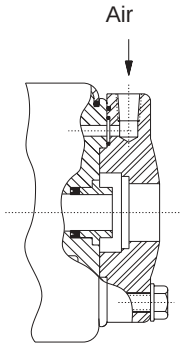

Figure 7

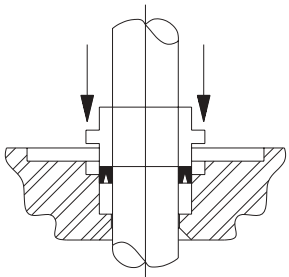

Figure 8

ACTUATOR STEM NYLON LOCK REPLACEMENT

The Nylon Locking Pin located in the middle of the stem thread keeps the valve stem from becoming loose due to vibrations. After every disassembly, the nylon locking pin must be replaced. Punch out the old nylon pin with a $^{1}/_{8}$ inch (3mm) or smaller diameter punch. Insert a new nylon locking pin.

ACTUATOR LUBRICATION

For optimum performance, lubricate once annually. Inject 5cc of STP * into the unthreaded thru hole in each end of the actuator. Roll actuator on a flat surface repeatedly to obtain uniform coverage of lubricant. Do not over lubricate. This is not a remedy for actuator failure.

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MAINTENANCE

CONTROL TOP ASSEMBLY

(* STP is a registered trademark of STP Corporation.)

1. Attach the activating nut with the two retaining rings to the non-threaded end of the actuator stem.
2. Place all seals on the base.
   - Three o-rings on the bottom of the base.

     IMPORTANT: When installing the largest diameter o-ring start it in groove opposite the air relief notch and press it in towards the notch. Be careful not to stretch o-ring.
   - Rear cover gasket.
   - Pressure relief plug into the hole on the rear of the base above the mounting flange.
3. Fasten the base to the actuator

   IMPORTANT: There are two possible configurations when mounting a control top base to an actuator. The mounting configuration is dependent upon if a solenoid is contained in the housing or not.
4. Orientate the control top so the air passage hole in the actuator lines up with the appropriate air passage in the control housing. See control top drawing in back of this manual for proper assembly.
5. Fasten the housing to the base with three screws and lock washers on the inside and one bolt and a lock washer on the outside.

SWITCH INSTALLATION

1. Assemble the switches to the mounting blocks as shown (see control top drawing in back of this manual). Slide the switch into the base mounting tracks. Tighten the switches in a random location. Instructions for proper adjustment are described later. **IMPORTANT:** Do not over tighten the screws used to mount the switches.
2. Place the wire harness onto the switch.

SOLENOID SELECTOR BLOCK INSTALLATION

IMPORTANT: The 4 way solenoid mounted into the control top is a single coil, spring return model.

1. Install all three selector block o-rings.
2. Place the selector block into the base. Pay special attention to its orientation

3. Place the solenoid on top of the selector block and fasten with two screws.

STOP BLOCK INSTALLATION - NO SOLENOID ONLY

1. Install all four o-rings into the stop block.
2. Place S.S. stop block support on top of stop block and fasten the stop block with two screws.
3. Fasten the wires to the electrical connector
4. Place the rubber gasket over the electrical connector threads. Push the threaded end of the connector through the hole on the rear cover. Orientate the connector flange as shown on the inside of the cover and fasten with the connector nut. Place all the wire harness and solenoid wires through the access hole on the base.
5. Follow the wire connection diagram and push the wire terminals over the electrical connector pins. Note: Use of needle nose pliers is recommended. Take care not to damage the wire insulation.

REAR COVER INSTALLATION

1. Place the four o-rings onto the mounting hole counter bores. Place the mounting screws into the holes. Coil the wires approximately one half turn so that they will fit into the rear cover cavity. The cover can be fastened to the base in any orientation because it is perfectly square.
2. Place the $^{1}/_{8}$" NPT air fittings in the housing as shown.
3. Set the switches
4. See section on switch adjustment.

FASTEN FRONT COVER

1. Place gasket into cover Mount cover with four screws

IMPORTANT: The four cover screws must be tightened until the gasket compresses and begins to bulge out the sides. The cover gasket must be sufficiently tightened to seal against spraying liquids. Failure to tighten could result in control top leakage and electrical failure.

2. Attach the Electrical Cable. Align the guide of the connector with the cable and push them together. Tighten completely by screwing the cable onto the connector.

MAINTENANCE

VALVE ASSEMBLY

⚠ WARNING

To prevent personal injury, keep hands and tools out of and away from valve bodies and stems when applying or releasing air to an actuator. the actuator stem asembly moves with extreme force and suddenness.

IMPORTANT: Replace all worn or damaged components as required. Spray stem and o-ring with Tri-Clover L-1011 Sanitary Lubricant. Make sure all valve bodies are mated properly before securing with clamps. Tighten all clamps securely to assure proper alignment. When disassembling and assembling valve, bench area should be clean to prevent marking and nicking of seats.

IMPORTANT: Replace nylon lock before threading valve stem onto actuator stem, see section Actuator Stem Nylon Lock Replacement.

762-227 & 862W-227 VALVE ASSEMBLY

1. Place o-ring into counter bore above air port on yoke.
2. Place green bearing retainer into bottom of actuator.
3. Place actuator onto yoke with threaded shaft end into the yoke. Align yoke air port with unthreaded thru hole in actuator end cap.
4. Fasten with four bolts and lock washers.
5. Lubricate o-ring with Tri-Clover L1011 Sanitary Silicone Spray. Insert o-ring into body, place washer on top of o-ring, place split bushing on top of washer. Fasten upper body to yoke with three bolts and lock washers.
6. Apply 60 psig air to actuator.
7. Push valve stem through bonnet until it meets the actuator stem. Partially thread valve stem onto actuator stem by hand until nylon lock resistance is felt. Apply an open end wrench over the valve stem flats, turn clock wise and tighten until valve stem meets actuator stem shoulder.
8. Remove air to actuator.
9. Place gasket in body groove and clamp together. Cycle valve at least 6 times. Operate valves after assembly to be sure they are operating correctly. Inspect all air line connections for leaks.

MAINTENANCE

762-227MRAL VALVE ASSEMBLY

1. Place o-ring into counter bore above air port on yoke.
2. Place green bearing retainer into bottom of actuator.
3. Place actuator onto yoke with short shaft end into the yoke. Align yoke air port with unthreaded thru hole in actuator end cap.
4. Fasten with four bolts and lock washers.
5. Insert the o-rings and bushings into the valve bonnets.
6. Attach the bonnet to the yoke with four screws and washers.
7. Slide the valve stem thru the bonnet and yoke, then screw the stem onto the actuator shaft.
8. Place the body gasket into the groove of the bonnet.
9. Assembly the two valve bodies and tee with two gaskets and two clamps to make up the valve body assembly. Each valve that makes up the Flo-Diversion Valve consists of one right hand tangential body and one left hand tangential valve body. The valve must be assembled to accomodate the process system as well as the capability to drain.
10. Insert the stem that is attached to the actuator into the proper end of the valve body assembly. Clamp the valve body to the bonnet.
11. Apply air to the actuator to allow for stem assembly.
12. Slide the o-ring and the hollow stem onto the stem attached to the actuator. Install the stem nut to hold the stems together and to compress the o-ring seal.
13. Remove air from the actuator.
14. Assembly the end cap to the bonnet with three screws and lock washers.
15. Push the grooved end of the clear plastic stem guard into the end cap.
16. Install the valve body gasket into the groove of the valve body.
17. Slide the end cap / bonnet assembly onto the valve stem then clamp to the valve body. Operate valves after assembly to be sure they are operating correctly. Inspect air line connections for leaks.

TROUBLESHOOTING

TROUBLESHOOTING GUIDELINES

The Flo-Diversion valve is relatively maintenance free with the exception periodic inspection. As with any precision equipment, however, occasional problems can arise. The troubleshooting chart provides a means of determining and correcting most mechanical and electrical problems.

Note: The troubleshooting chart is divided into two parts, one mechanical and electrical. A list of the control panel components with their reference designations and a brief description of their function is included in the *Parts List* section following the *Troubleshooting* section. The Low Temperature Limit switch (LSI), and the indicating lights are part of the applicable HTST Controller or Safety Thermal Limit Recorder Controller used with the Flo-Diversion Valve. If trouble is encountered with these external components, refer to the applicable service manual provided with the equipment.

MECHANICAL TROUBLE

PROBLEM	PROBABLE CAUSE	REMEDY
1. Inadequate air supply to valves.	a. Inadequate air supply to valves.	a. Inspect air lines for leaks or obstructions and take necessary corrective action.
	b. Faulty Filter-Regulator.	b. Test Filter-Regulator and repair or replace if defective.
	c. Defective solenoid valve.	c. Test solenoids. Replace if necessary.
	d. Broken diaphragm on quick exhaust valve.	d. Replace diaphragm.
	e. Response time above one second.	e. Check for excessive back pressure.
2. Valves will not assume forward flow position at any selection switch setting.	a. Inadequate air supply.	a. Check air system as described above.
	b. Capillary tube of pressure-thermo switch in controller is broken or leaking.	b. Replace switch, refer to controller manual.
	c. Electrical difficulties.	c. Refer to electrical troubleshooting chart and take corrective action.
3. Valve will not assume divert position.	a. Quick exhaust valve is not functioning properly.	a. Inspect quick exhaust valve and remove obstruction or replace valve.
	b. Obstruction in divert or leak detector valve.	b. Disassemble valve and remove obstruction.
4. Timing pump will not start.	a. Timing pump switch is not on.	a. Turn on switch.
	b. One or both valve plug assemblies are not properly connected to actuator stem.	b. Assemble valve stems to actuator stems correctly.
	c. Microswitch roller is not engaging indicating nut on actuator stem.	c. Adjust microswitch.
5. Divert valve does not move to forward flow.	a. Adjustable cam screw is loose on the timer (CT1).	a. Establish proper setting and tighten screw.
	b. Timing cam is loose on shaft.	b. Tighten setscrew.
	c. Defective timer.	c. Refer to instructions furnished with the timer and take necessary corrective action.
	d. Timer (CT1) will not operate.	d. Loosen gear rack until timer starts, then tighten gear rack screw.

TROUBLESHOOTING

ELECTRICAL TROUBLE

PROBLEM	PROBLEM	PROBLEM
1. Product Position.	a. Timing pump does not start - cold temperature.	a1. Put test lamp on terminals two and three. If lamp lights, proceed below. If no light, check power main and fuse in STLR controller. Blown fuse - test primarily, solenoid valve coils, CTR1, CTR2, and CTR3 for short circuits. a2. Push test lamp on terminals 2 and 17. If light on, check motor starter coil and overload contacts. a3. Terminals 2 and 16. If no light proceed below. If light on, check CRT2 coil and contact. a4. Terminals 2 and 4. If no light, proceed below. If light on, check the thermo controller and timing pump start-stop switch and contact block 3 on the Inspect-Product-Clean switch. a5. Terminals 2 and 18. I no light, adjust or replace the microswitch (MS1) in the divert valve. If light on, adjust or replace the microswitch (MS2) in the leak detector.
	b. Timing pump does not run - pasteurizing temperature.	b1. Check Steps a1 through a3 above. b2. Put test lamp on terminals 2 and 5. If no light, test STLR controller high side.
	c. Divert valve does no move to forward flow.	c1. Check Step a1 above. c2. Terminals 2 and 6. If no light, check STLR controller for contact closure on high side. If light on, check contacts on the manual diversion switch and contact block 2 on Inspect-Product-Clean switch. c3. Disconnect leads to SV1. Test for continuity and if none, replace coil.
	d. Leak detector valve does not assume forward flow.	d1. Terminals 2 and 11. If no light, proceed below. If light on, check air supply to solenoid SV2 and for mechanical troubles in SV2. d2. Terminals 14 and 2. If no light, proceed below. If light on, check for proper functioning of the timing motor TR2. Adjust or replace the switch. d3. Terminals 10 and 2. If no light, go to Step c2. If light is on, check for proper contact closure on TR3 between wire number 10 and 14. d4. Disconnect leads to SV2. Test for continuity and if none, replace coil.

TROUBLESHOOTING

ELECTRICAL TROUBLE (CONT.)

PROBLEM	PROBLEM	PROBLEM
1. Product Position (Cont.)	e. Green light not on (valve moved to forward flow).	e1. Replace bulb with known working one. (24VAC). If light not on, proceed below. e2. Put test lamp on terminals 2 and 7. If light on, check 220V to 24V light transformer. If light not on, adjust or replace MS1.
	f. Red light not on - STLR controller at low temperature.	f1. Check Step e1. t2. Put test lamp on terminal 2 and 4. If light on, check the 220V to 24V light transformer. If light not on, adjust or replace MS1. f3. Terminal 2 and 18. If no light, adjust or release MS1. If light on, adjust or replace MS2.
	g. Valve does not assume divert position.	g1. Terminal 2 and 6. If light on, STLR recorder temperature contact stuck in high temperature position. No light, check for mechanical problems in valves.
2. Inspect Position	a. Divert valve does not assume forward flow.	a1. Terminals 2 and 3. If light on, proceed below. If no light, check power main and fuse in STLR instrument. a2. Terminals 2 and 10. If no light, check Inspect-Product-Clean switch contact block 2 and also check CRT2 timing contact, wire number 3 and 9. There is an adjustable time delay before these contacts close.
	b. Leak detector valve does no assume forward flow.	b1. Check Step a1. b2. put test lamp on terminals 2 and 11. Proceed as described under Step a2.
3. Clean Position	a. Divert valve will not assume forward flow.	a1. Put test lamp on terminals 2 and 8. If no light, proceed below. If light on, check motor on CT1 and cam operated switches. a2. Terminals 2 and 12. If no light, proceed below. If light on, test for mechanical problems in the valves. Check air supply to solenoid valves. a3. Terminals 2 and 9. If no light, check timing contact on CRT2 and CRT3 wire number 3 and 9. (Wait for time delay to elapse.) If light on, check contact block 1 on Inspect-Product-clean switch.

PARTS LIST

CONTROL PANEL COMPONENTS

- **3-position selector switch**

  Places divert and leak detect valve in proper circuit.

  "Inspect" puts air on valves to permit dismantling. Uses solenoid valve #1 and solenoid valve #2.

  "Product" permits valve function only in approved and recognized procedures. Uses solenoid valve #1, solenoid valve #2, microswitch #1, microswitch #2, timer #2, and timer #3.

  "Clean" Permits CIP of the valve with the HTST unit. Uses solenoid valve #1, solenoid valve #2 and timer #1

- **Solenoid Valve #1 (SV1)**

  Controls air supply to the divert valve.

- **Solenoid Valve #2 (SV2)**

  Controls air supply to the leak detect valve.

- **Microswitch #1 and #2 (MS1 and MS2)**

  Controls red and green indicating lights, timing pump in divert position and frequency pin.

- **Cam Timer #1 (CT1)**

  Controls valve cycling during clean operation. Returns to start position after CIP cycle is complete. Contains drive motor, cam shaft, three cam actuated switches and three sets of cams, both stationary and adjustable. Cam #1 is homing cam, cam #2 is for divert valve and cam #3 is for leak detector valve.

- **Control Relay with Timer #1 (CRT1)**

  Delays opening of forward flow part of leak detector valve for a predetermined length of time, after divert valve has assumed forward flow position. Adjustable setting from 0 to 15 seconds.

- **Control Relay with Timer #2 (CRT2)**

  Energized when selector switch is placed in "Product" position. It is used to delay valve operation until timing pump is completely stopped. Set at 15 seconds. (Off Delay)

- **Control Relay with Timer #3 (CRT3)**

  Energized when the timing pump circuit is closed. It is used to delay the pump "Dropout" operation. Set at 1 second.

- **Manual Diversion Switch**

  Used to manually position valves in divert position when selector switch is in the "Product" position

- **Terminal Strip (TB1)**

  Used to interconnect panel components to external components. Also used for troubleshooting electrical circuits.

- **Low Temperature Limit Switch**

  Located in the STLR controller, not in the Flo-Diversion valve control unit.

- **Timer (CRT5)**

  Places Flo-Diversion Valve in divert flow position for ten minutes in the clean position.

- **Seal on Control Box**

  Meets requirements of regulatory agencies.

PARTS LIST

PANEL

How to order replacement parts

All orders for repair parts must contain the following data:

1. Complete model number (from name plate).
2. Serial number (from name plate).
3. Key number and description.

The following exploded view and accompanying parts facilitate ordering repair parts from the factory. All parts list illustrated are indexed to the parts list by key numbers.

Key #	Description
1	Enclosure (stainless steel)
3	Panel Nameplate
4	Air Filter Regulator
5	Regulator Fitting 1/8" NPT
6	Bulkhead Fitting
7	Nameplate
8*	Knob Operator with Contact Block
9*	Pushbutton (green) with Contact Block
10	Cord Connector
11	Conduit Nut
12	Connector
13	Hose (black) each 10 ft. long
14	Connector
15	Brass Nut
16	Elbow Fitting - 1/8" NPT x 1/4" PL
17*	Solenoid Head & Tail Module Set

Key #	Description
18*	Poly-Flo Tubing (1 ft.)
19*	Solenoid Valve
19A*	Solenoid Coil Only
21	2-Pole Timed Relay (115 or 220 VAC)
22	Relay Bracket
23*	Pneumatic Timer for Relay
24	3-Cam Timer (115 or 220 VAC)
25	Cam Timer Gear Rack
25A	Cam Timer Motor Only (110 or 220 VAC)
26	Terminal Strip Assembly (complete)
26A	Barrier Strip Only
26B	Terminal Only
26C	End Clamp Only
27	Timer Socket
28	Timer - Solid state plug in (115 or 220 VAC)

* It is recommended that one spare part be stocked for each item marked.

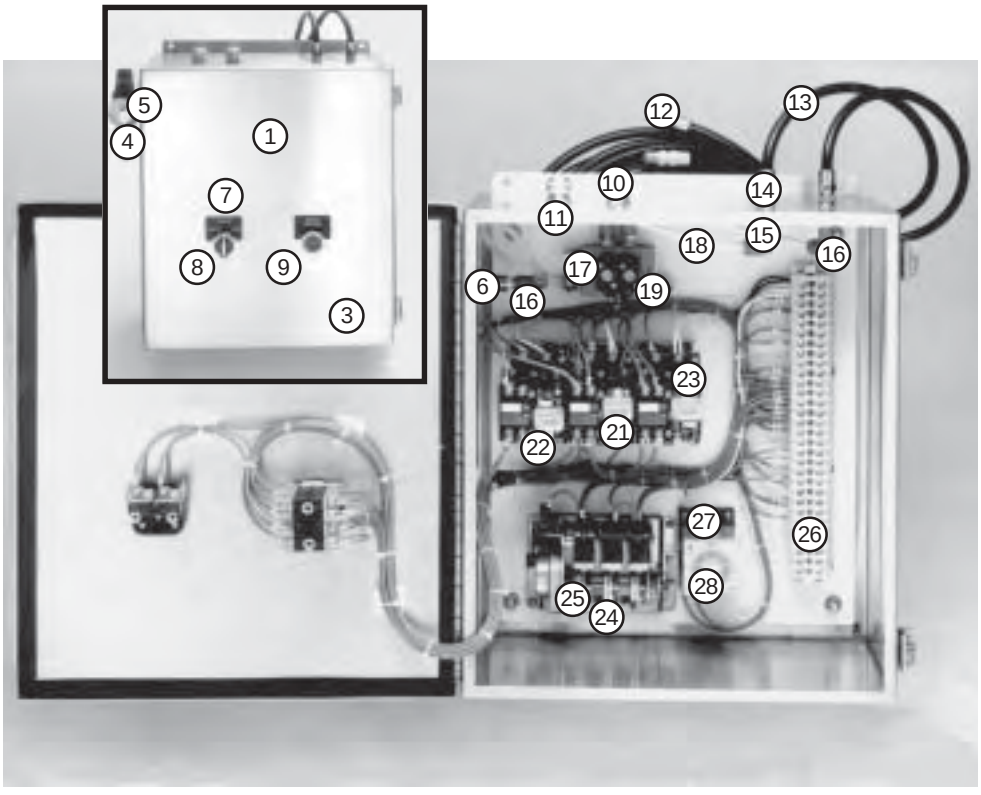
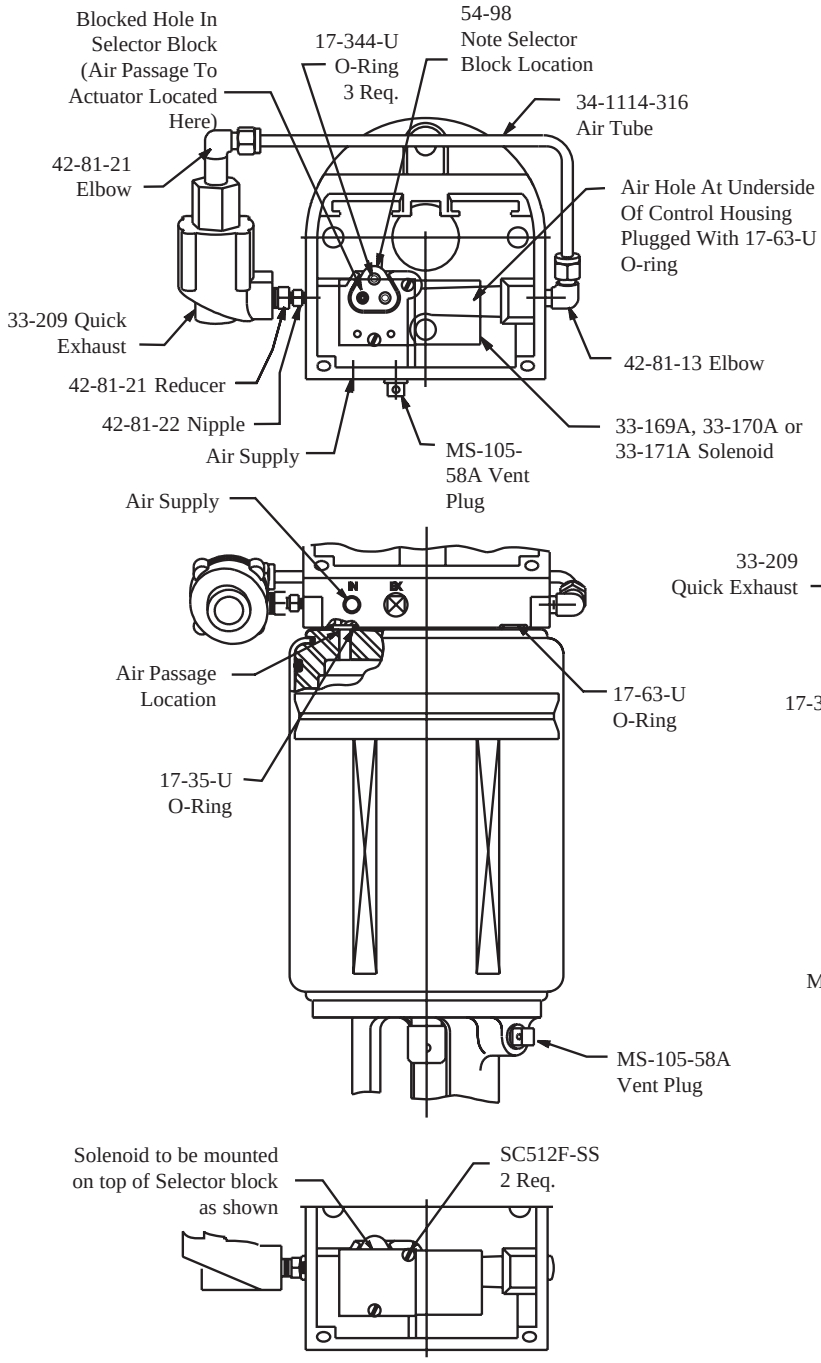


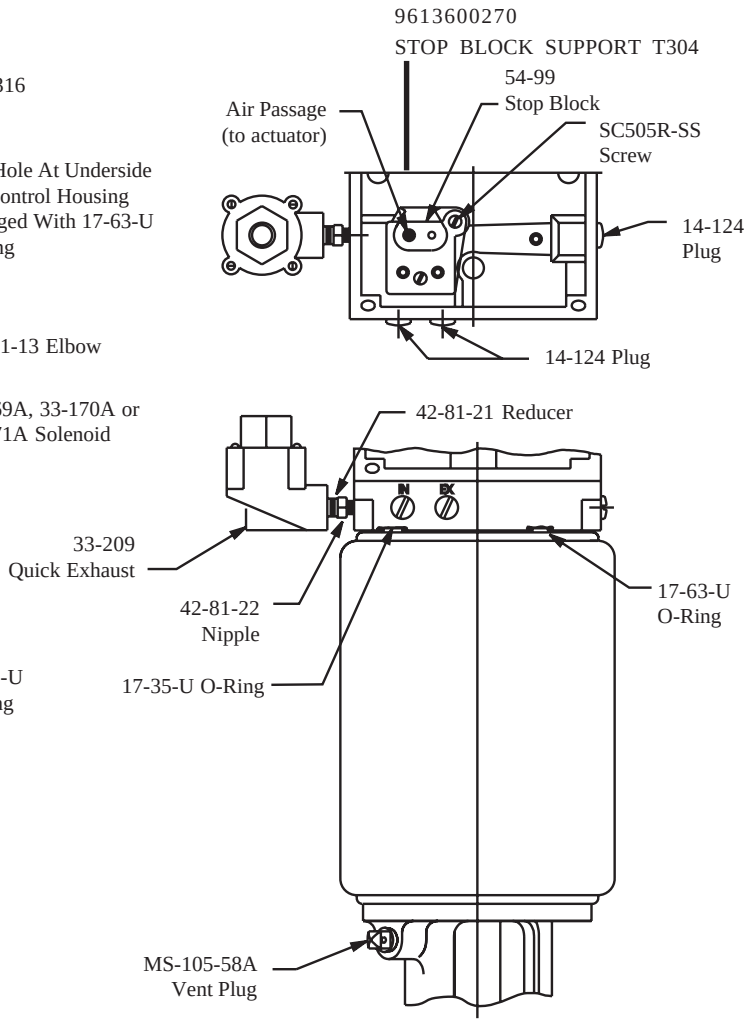
Figure 9: Panel

74-115-X-Y CONTROL HOUSING

CONTROL HOUSING WITH SOLENOID

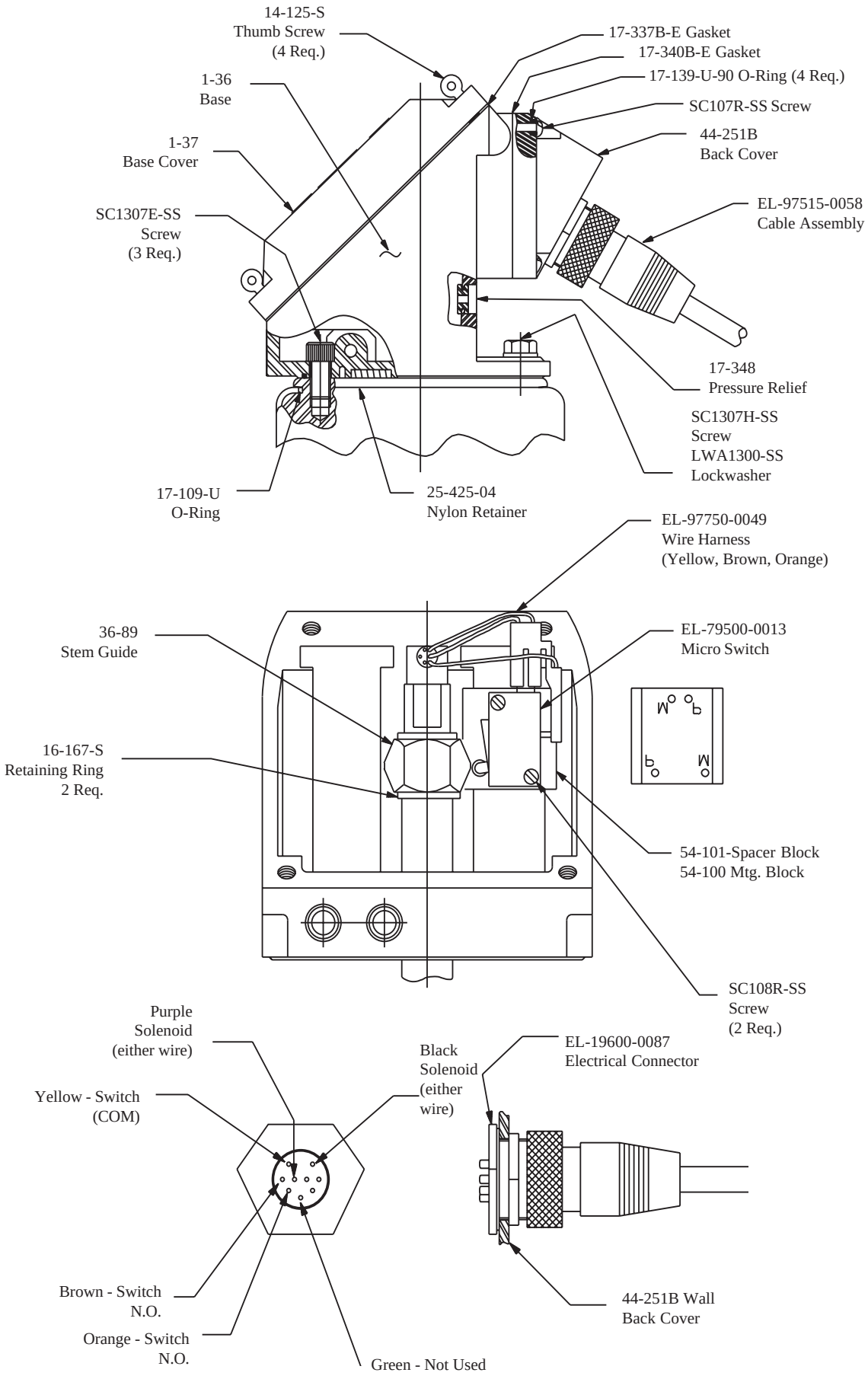

Blocked Hole In Selector Block (Air Passage To Actuator Located Here)
17-344-U O-Ring 3 Req.
54-98 Note Selector Block Location
34-1114-316 Air Tube
42-81-21 Elbow
Air Hole At Underside Of Control Housing Plugged With 17-63-U O-ring
33-209 Quick Exhaust
42-81-13 Elbow
42-81-21 Reducer
42-81-22 Nipple
33-169A, 33-170A or 33-171A Solenoid
Air Supply
MS-105-58A Vent Plug
Air Supply
Air Passage Location
17-63-U O-Ring
17-35-U O-Ring
MS-105-58A Vent Plug
Solenoid to be mounted on top of Selector block as shown
SC512F-SS 2 Req.

CONTROL HOUSING WITHOUT SOLENOID



Qty Microswitch	1	2
1 switch	X	
2 switches		X

"Y" Solenoid	1	2	3	4
110 VAC PN# 33-169A	X			
24 VAC PN# 33-170A		X		
24 VDC PN# 33-171A			X	
No Solenoid				X


14-125-S
Thumb Screw
(4 Req.)
17-337B-E Gasket
17-340B-E Gasket
17-139-U-90 O-Ring (4 Req.)
1-36
Base
SC107R-SS Screw
44-251B
Back Cover
1-37
Base Cover
EL-97515-0058
Cable Assembly
SC1307E-SS
Screw
(3 Req.)
17-348
Pressure Relief
SC1307H-SS
Screw
LWA1300-SS
Lockwasher
17-109-U
O-Ring
25-425-04
Nylon Retainer
EL-97750-0049
Wire Harness
(Yellow, Brown, Orange)
36-89
Stem Guide
EL-79500-0013
Micro Switch
16-167-S
Retaining Ring
2 Req.
54-101-Spacer Block
54-100 Mtg. Block
SC108R-SS
Screw
(2 Req.)
Purple
Solenoid
(either wire)
Black
Solenoid
(either
wire)
EL-19600-0087
Electrical Connector
Yellow - Switch
(COM)
Brown - Switch
N.O.
Orange - Switch
N.O.
Green - Not Used
44-251B Wall
Back Cover

PARTS LIST

762-227M

How to order replacement parts

All orders for repair parts must contain the following data:
Note: Part numbers are for reference. Consult Service Kit Catalogue or Spares CD for proper service kits.

1. Complete model number (from name plate).
2. Serial number (from name plate).
3. Key number and description.

The following exploded view and accompanying parts list facilitate ordering repair parts from the factory. All parts illustrated are indexed to the parts list by key numbers.

Key #	Description	1½"	2"	2½"	3"
1	Body	7-1022TM-1½-316L	7-1022TM-2-316L	7-1022TM-2½-316L	7-1022TM-3-316L
2	Stem	19-1276-1½-316L	19-1276-2-316L	19-1276-2½-316L	19-1276-3-316L
3	Gasket	17-325-1½-U	17-325-11/2-U	17-325-2½-U	17-325-3-U
4	Clamp	13MHHVM-3-S	13MHHVM-3-S	13MHHVM-4-S	13MHHM-5-S
5	Upper Body	7-1024TM-1½-316L	7-1024TM-2-316L	7-1024TM-2½-316L	7-1024TM-3-316L
6	O-Ring	17-17-U	17-17-U	17-17-U	17-17-U
7	Bushing	40-64	40-64	40-64	40-64
8	Yoke	12-496-S	12-496-S	12-496-S	12-496-S
9	Screw	SC1308H-SS	SC1308H-SS	SC1308H-SS	SC1308H-SS
10	Lockwasher	LWA1300-SS	LWA1300-SS	LWA1300-SS	LWA1300-SS
11	Actuator	25-484-S	25-484-S	25-484-S	25-484-S
12	Packing Retainer	25-428-04	25-428-04	25-428-04	25-428-04
13	O-Ring	17-35-U	17-35-U	17-35-U	17-35-U
14	Seal Washer	15-171-316L	15-171-316L	15-171-316L	15-171-316L
15	Vent Plug	MS-105-58A-CP	MS-105-58A-CP	MS-105-58A-CP	MS-105-58A-CP
16	Gasket	40MP-U-1½	40MP-U-2	40-MP-U-2½	40MP-U-3
17	Clamp	13MHHM-1½-S	13MHHM-2-S	13MHHM-2½-S	13MHHM-3-S

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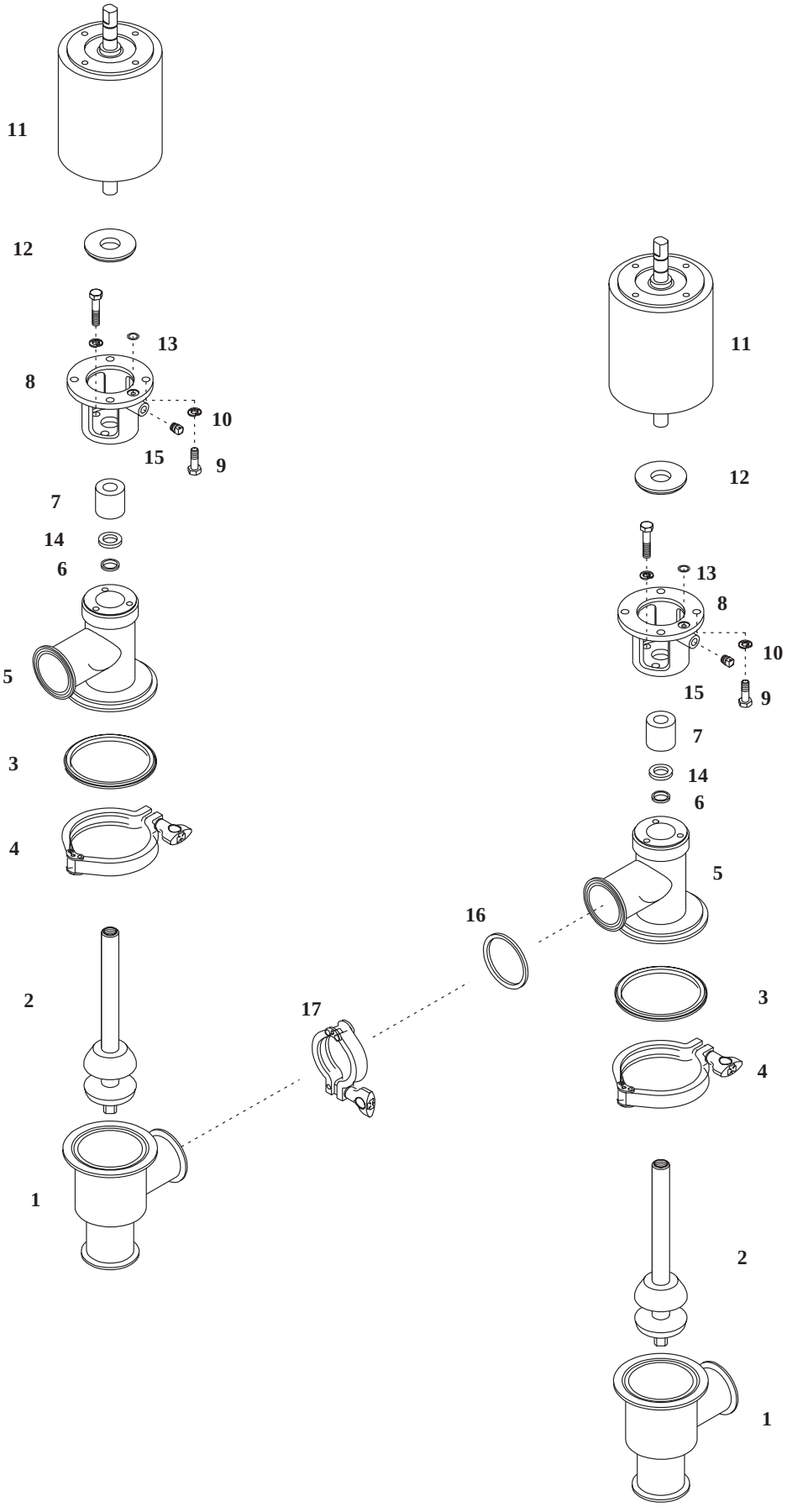
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PARTS LIST

862W-227

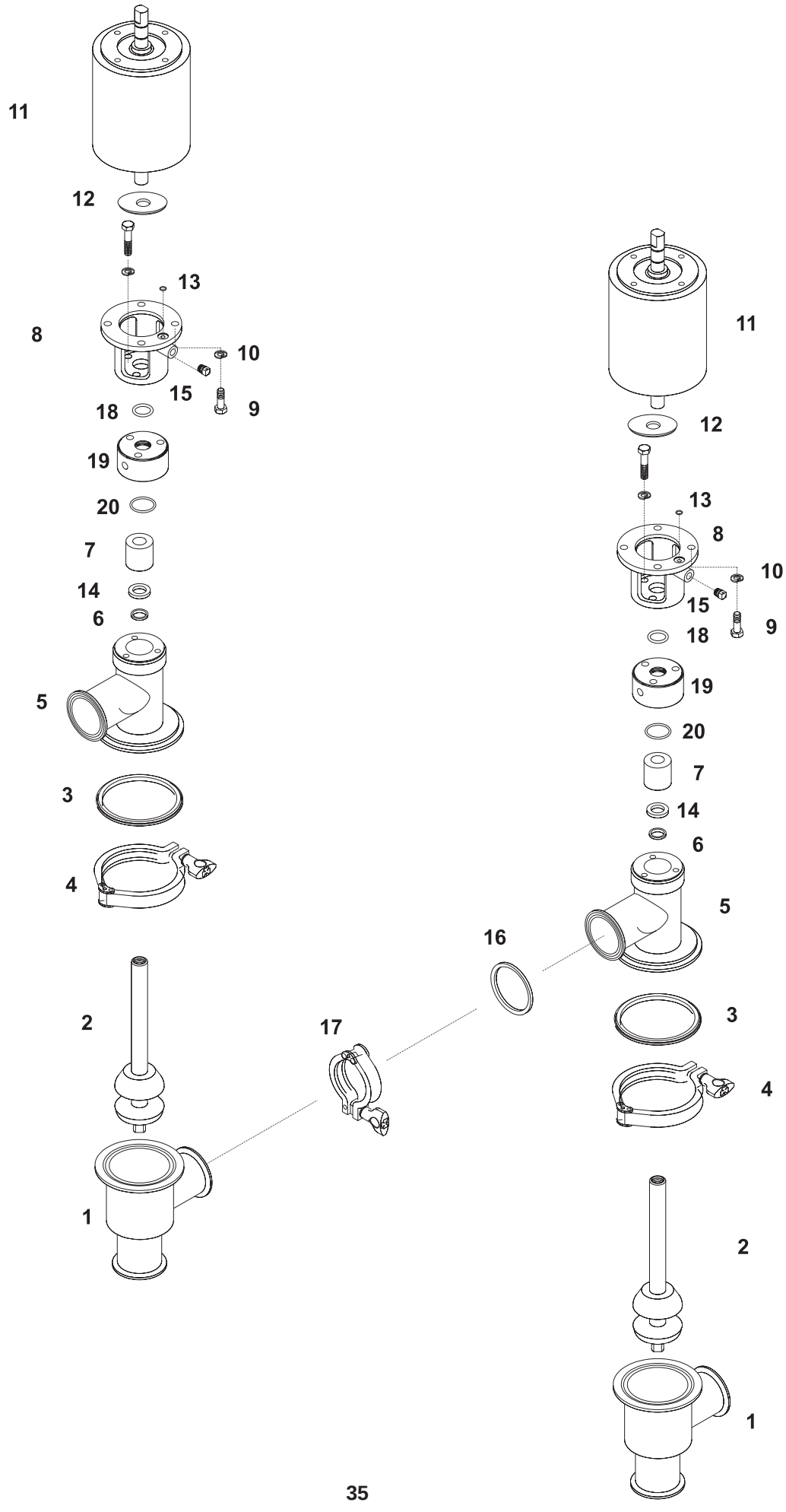
How to order replacement parts

All orders for repair parts must contain the following data:

1. Complete model number (from name plate).
2. Serial number (from name plate).
3. Key number and description.

The following exploded view and accompanying parts list facilitate ordering repair parts from the factory. All parts illustrated are indexed to the parts list by key numbers.

Key #	Description	1 1/2"	2"	2 1/2"	3"
1	Body	7-1022TM-1 1/2-316L	7-1022TM-2-316L	7-1022TM-2 1/2-316L	7-1022TM-3-316L
2	Stem	19-1384-1 1/2-316L	19-1384-2-316L	19-1384-2 1/2-316L	19-1384-3-316L
3	Gasket	17-325-1 1/2-SFY	17-325-1 1/2-SFY	17-325-2 1/2-SFY	17-325-3-SFY
4	Clamp	13MHHVM-3-S	13MHHVM-3-S	13MHHVM-4-S	13MHHM-5-S
5	Upper Body	7-1024TM-1 1/2-316L	7-1024TM-2-316L	7-1024TM-2 1/2-316L	7-1024TM-3-316L
6	O-Ring	17-17-SFY	17-17-SFY	17-17-SFY	17-17-SFY
7	Bushing	40-71-R641	40-71-R641	40-71-R641	40-71-R641
8	Yoke	12-496-S	12-496-S	12-496-S	12-496-S
9	Screw	SC1308H-SS	SC1308H-SS	SC1308H-SS	SC1308H-SS
10	Lockwasher	LWA1300-SS	LWA1300-SS	LWA1300-SS	LWA1300-SS
11	Actuator	25-484-S	25-484-S	25-484-S	25-484-S
12	Packing Retainer	25-428-04	25-428-04	25-428-04	25-428-04
13	O-Ring	17-35-U	17-35-U	17-35-U	17-35-U
14	Seal Washer	15-171-316L	15-171-316L	15-171-316L	15-171-316L
15	Vent Plug	MS-105-58A-CP	MS-105-58A-CP	MS-105-58A-CP	MS-105-58A-CP
16	Gasket	40MP-SFY-1 1/2	40MP-SFY-2	40-MP-SFY-2 1/2	40MP-SFY-3
17	Clamp	13MHHM-1 1/2-S	13MHHM-2-S	13MHHM-2 1/2-S	13MHHM-3-S
18	Screw	SC132OH-SS	SC132OH-SS	SC132OH-SS	SC132OH-SS
19	Spacer	12-508-316L	12-508-316L	12-508-316L	12-508-316L
20	O-Ring	R3-1-09B-7-SFY	R3-1-09B-7-SFY	R3-1-09B-7-SFY	R3-1-09B-7-SFY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PARTS LIST

762-227MRAL

How to order replacement parts

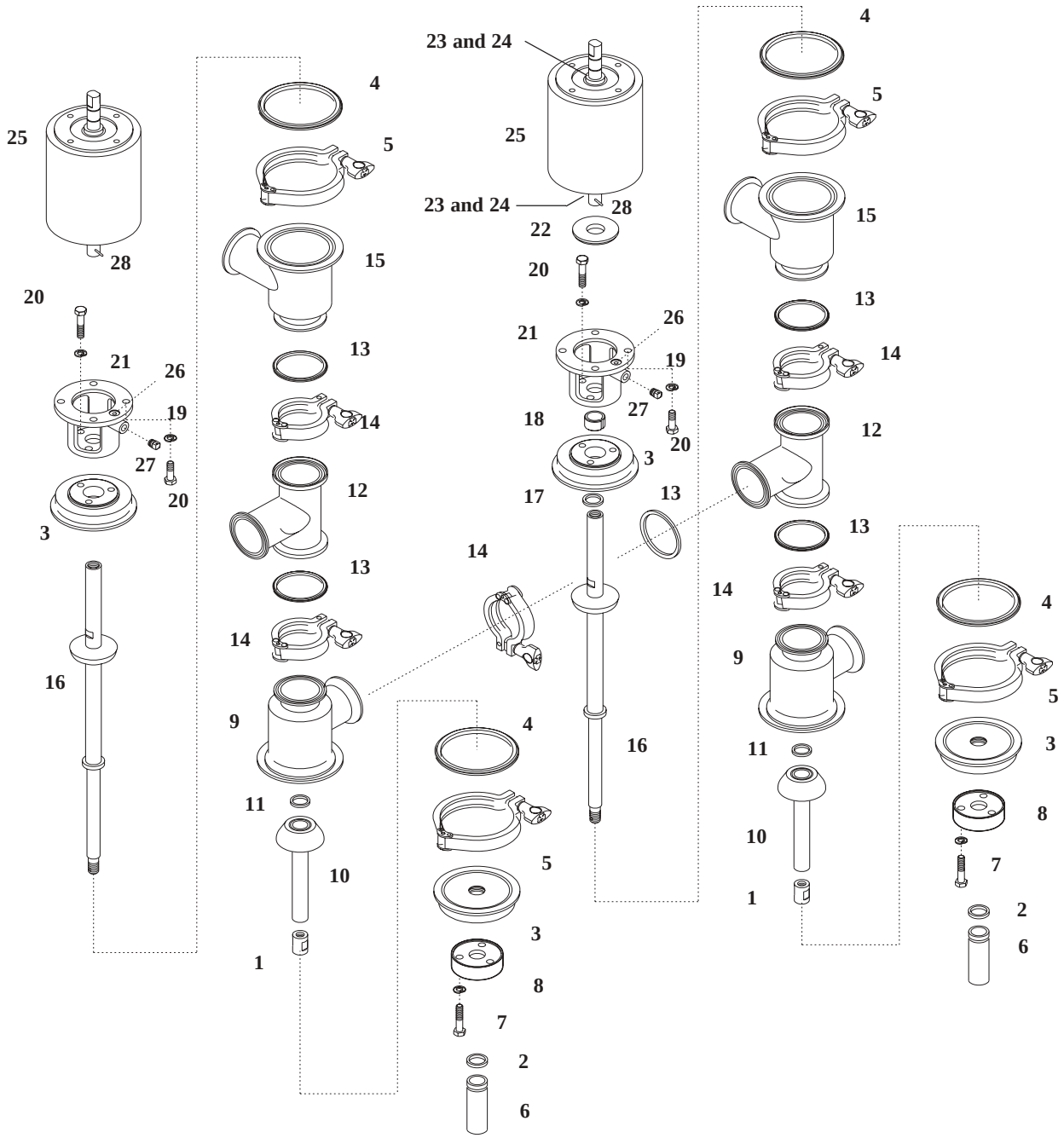
All orders for repair parts must contain the following data:

1. Complete model number (from name plate).
2. Serial number (from name plate).
3. Key number and description

The following exploded view and accompanying parts list facilitate ordering repair parts from the factory. All parts illustrated are indexed to the parts list by key numbers.

Key #	Description	2"	2 1/2"	3"	4"
1	Nut	13-171-316L	13-171-316L	13-171-316L	13-174-316L
2	0-Ring	17-158-U	17-158-U	17-158-U	17-342-U
3	Bonnet	12-487-11/2-316L	12-487-2 1/2-316L	12-487-3-316L	12-515-316L
4	Gasket	17-325-11/2-U	17-325-2 1/2-U	17-325-3-U	17-62-4 1/2-U
5	Clamp	13MHHM-3-S	13MHHM-4-S	13MHHM-5-S	H13MHHM-4-S
6	Stem Guard	23-133	23-133	23-133	23-140
7	Screw	SC1312H-SS	SC1312H-SS	SC1312H-SS	SC1312H-SS
8	End Cap	23-129-316L	23-129-316L	23-129-316L	23-139-316L
9	R.H.Body	7-1047RM-2-316L	7-1047RM-2 1/2-316L	7-1047RM-3-316L	7-1047RM-4-316L
10	Lower Stem	19-1334-2-316L	19-1334-2 1/2-316L	19-1334-3-316L	19-1409-4-316L
11	O-Ring	01-1165-11	01-1165-11	01-1165-11	17-342-U
12	Body	7-1071TM-2-316L	7-1071TM-21/2-316L	7-1071TM-3-316L	7-1071TM-4-316L
13	Gasket	40MP-U-2	40MP-U-2 1/2	40MP-U-3	40MP-U-4
14	Clamp	13MHHM-2-S	13MHHM-2 1/2-S	13MHHM-3-S	13MHHM-4-S
15	L.H.Body	7-1047LM-2-316L	7-1047LM-2 1/2-316L	7-1047LM-3-316L	7-1047LM-4-316L
16	Stem	19-1333-2-316L	19-1333-2 1/2-316L	19-1333-3-316L	19-1408-4-316L
17	O-Ring	17-17-U	17-17-U	17-17-U	17-89-U
18	Bushing	40-63	40-63	40-63	40-73
19	Lockwasher	LWA1300-SS	LWA1300-SS	LWA1300-SS	LWA1300-SS
20	Screw	SC1308H-SS	SC1308H-SS	SC1308H-SS	SC1308H-SS
21	Yoke	12-496-S	12-496-S	12-496-S	12-534-S
22	Packing Retainer	25-428-04-MAT'L	25-428-04-MAT'L	25-428-04-MAT'L	25-428-04-MAT'L
23	Packing	17-98	17-98	17-98	17-98
24	Seal Retainer	25-428-05	25-428-05	25-428-05	25-428-04-MAT'L
25	Actuator	25-484-S	25-484-S	25-484-S	25-428-05
26	O-Ring	17-35-U	17-35-U	17-35-U	17-35-U
27	Vent Plug	MS-105-58A-CP	MS-105-58A-CP	MS-105-58A-CP	MS-105-58A-CP
28	Pin	9-300	9-300	9-300	9-300

PARTS LIST



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ALLEN-BRADLEY SLC 500 PLC

TRI-CLOVER PANEL MODELS 48-2762-1 AND 48-2762-2

The following section of the manual covers the use and application of the Tri-Clover programmable controller version of the Flo-Diversion Valve Panel. The control panel utilizes the Allen Bradley SLC 500 small programmable logic controller (PLC) with UVPROM memory chip to retain permanent logic storage for the Flo-Diversion application program.

The control panel is available in two versions. The first version, 48-2762-1, is intended to operate with Flo-Diversion valves having solenoids mounted on the valve actuator control top. This version control panel supplies 24 VAC to the microswitches by means of an internal transformer. This low voltage feature gives added safety protection for maintenance and regulatory personnel when servicing the valve. The second version, 48-2762-2, includes solenoids mounted inside the control panel.

The new PLC Panel can also be used with the 262 style Flo-Diversion Valve. The difference that needs to be observed is the microswitches on the 262 valve are wired to a N.C. contact instead of the N.O. contact as with the 762 valves.

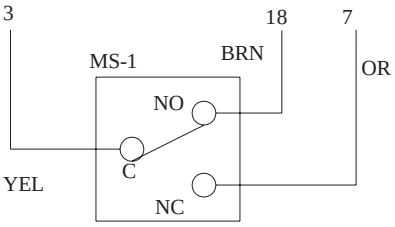
The below drawings shows the microswitches in their position when no air is on the valve and the pasteurization temperature is below the legal setting.

Notice that the microswitch wires #18 and #4 are wired to the N.C. contacts for the 262 valves and they are wired to the N.O. contacts for the 762 valves. This is the result of mounting the switches in the “groove” on the 262 valve and on the high part of the “nut” on the 762 valve (Microswitch button is “pushed in” forcing the “common” to make with the “N.O.” contact.).

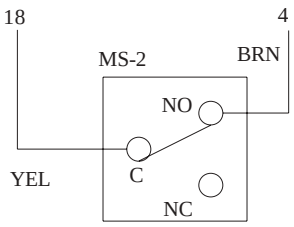
Note: The valves do not have air applied to the actuators at this time.

The control logic is designed accordingly for either valve to reflect this change in the microswitch wiring.

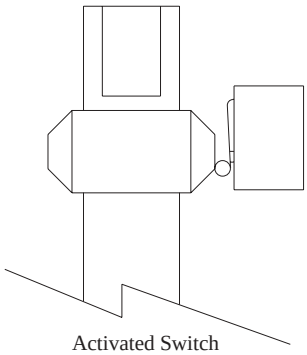
Microswitch wiring for 762, 762RA Valves



Divert Valve

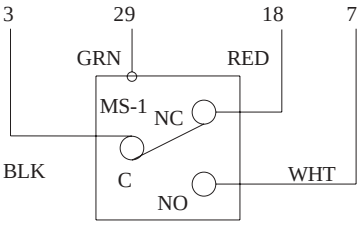


Leak Detect

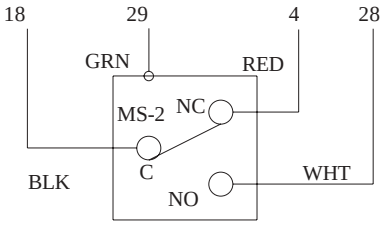


Activated Switch
762

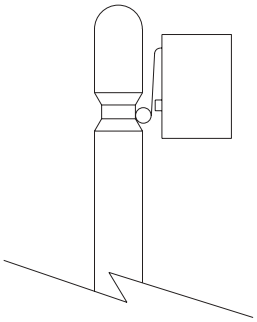
Microswitch wiring for 262 Valves



Divert Valve



Leak Detect



Deactivated
Switch
262

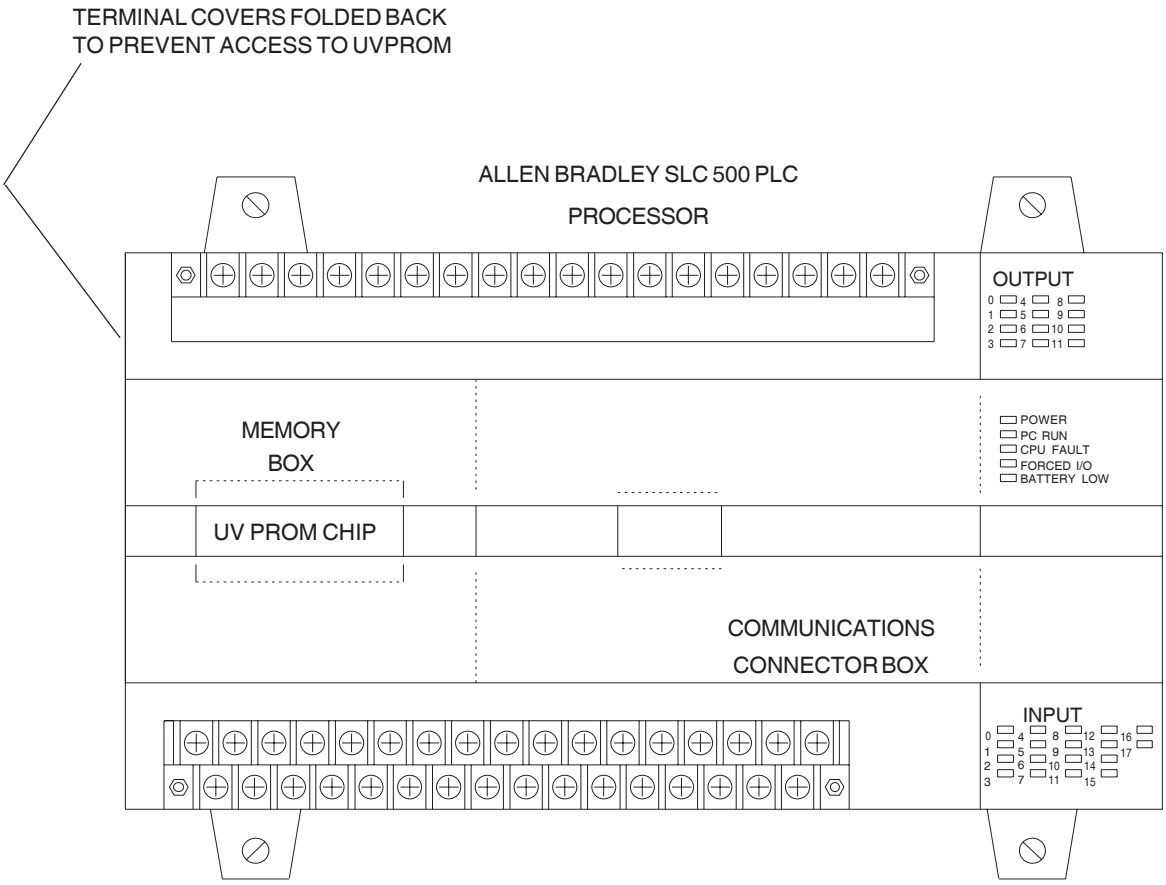
STATE AND FEDERAL REGULATORY SEALS

Refer to the picture of the Allen-Bradley SLC 500 below.

NOTE: Contact Alfa Laval for information on new Micro Logix 1200 panel.

A place is provided for the Inspecting Regulatory Agencies to place a seal on the panel. The panel door clamping latch has a hole in which to insert a wire seal. This is normally done after the total HTST system has been tested and proven to function properly. This will prevent access to the internal panel parts unless the seal is broken.

With the specially marked UVPROM in place and also the door latch sealed, the integrity of the legal program and wiring will be maintained.



If a Regulatory seal has been violated, either the door seal or the memory seal, the following procedure should be accomplished before attempting to place the control panel in operation

1. Remove power from the control panel.
2. Physically check the internal parts of the control panel for damage, loose wires, additions/ changes or evidence of tapering. Take appropriate action to correct the problems. Call Tri- Clover for assistance if necessary.
3. If the seal over the memory compartment is broken, open the lid to the compartment and physically examine the UVPROM memory module. BE SURE the lamicoid strip is still glued over the module window. This lamicoid strip should be labeled with the Tri-Clover logo and the software version number stamped on it. If the module shows evidence of tampering or the lamicoid strip is missing, notify Tri-Clover so that a new UVPROM module with the legal program installed can be immediately forwarded to the customer.
4. No cable or programming device should be connected to the Communication Port on the processor. If a cable exists, there is strong evidence of attempted program tampering. However, program changes cannot be made unless the program PASSWORD is known. This PASSWORD is available to only selected Tri-Clover engineering personnel. Recycle power to the control panel and the contents of the legal UVPROM module will be downloaded to overwrite the contents of the RAM. (See comments below).
5. Make sure the correct (Tri-Clover) UVPROM memory chip is installed properly in the socket and that the control panel has been checked as described above. Place power on the panel. The contents of the UVPROM module is downloaded to the RAM memory each time the power is cycled off/on. This insures that ONLY THE UVPROM MEMORY will run the processor. If the RAM memory had been changed, tampered with, or glitched, it will now assume the program as installed on the UVPROM. If somehow the memory contents of the RAM and UVPROM do not match, a fault will be indicated and the controller will not run. The controller will not run if a UVPROM module is not installed.
6. Test for the proper operation of the panel by following the "Prestarting" procedures listed elsewhere in this manual. Progress through the "Inspect, Product, Clean" positions of the selector switch and check for proper valve operation. If the control panel functions as designed, then the correct legal memory is installed.

NOTE: When calling Tri-Clover for assistance, be prepared to provide Tri-Clover with all the pertinent information:

1. the panel model number,
2. software version number,
3. electrical drawing number, and
4. serial number.

All this information can be found on the two legend plates glued to the outside panel door.

SOFTWARE VERSION NUMBERS (AS OF 8/4/94)

It is to be expected that software revisions will have to be accomplished as State and/or Federal regulations dictate. The Federal (FDA) Regulatory Agency will be notified of each Tri-Clover software revision and version number.

At this time, the following Tri-Clover software versions exist. (Additional versions will be included with future reprints of this manual):

VERSION 1.01 This has the same operating procedure based upon the original Electro-mechanical control panel as described in this manual. All the switch operations and timing functions are identical. 15 sec. delay for "Product" switch, 1 sec. delay for Timing pump dropout, 3 sec. delay for leak detect valve, and 10 min. delay for CIP start.

VERSION 1.02 Same as 1.01 above except that the "leak detect" timer is changed from 3 sec. to 1 sec.

The "Product" switch time changed from 15 sec. to 20 sec.

VERSION 1.03 Same as 1.01 above except that the Booster Pump is delayed from starting for (Standard)* 10 min. when in CIP mode and when using the Customer controlled input to the PLC.

VERSION 1.04 Same as 1.01 above except that all flow promoting devices are shut down when switched to CIP position.

The "Product" switch time changed from 15 sec. to 30 sec.

VERSION 1.05 Same as Version 1.03 except that a 16 second time delay has been added after HI-FLOW.

* 1.05 is the standard installed in all panels shipped unless otherwise noted! See version no. stamped on UVPROM module.

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ALLEN-BRADLEY SLC 500 PLC

FIXED HARDWARE STYLE

The SLC 500 Fixed Hardware Style controllers consist of a CPU with 1000 instruction capacity, a power supply and a fixed number of I/O contained in a single package. These processors are designed for industrial environments with ambient temperature from 0 to +60C.

The Fixed Hardware Style controllers are available in 20 I/O - 12 Inputs & 8 Outputs.

Each device has LED indicators to show the status of each I/O point.

The internal power supply for a fixed style processor operates from 120 Volts AC.

There are five LED diagnostic indicators on the front of each processor.

- POWER
- PC RUN
- CPU FAULT
- FORCED I/O
- BATTERY LOW

POWER – Indicates that the processor is energized and power is being applied.

PC RUN – Indicates the processor is in the Run Mode.

CPU FAULT – Indicates the processor has detected an error in the CPU, expansion I/O or memory. Outputs are turned off and operation is automatically stopped.

FORCED I/O – Indicates one or more input or output addresses have been forced to an ON or OFF state.

BATTERY LOW – An optional battery provides backup power for the **CMOS RAM** Memory. This LED alerts you when the battery should be replaced. Tri-Clover does not supply this option. An internal Capacitor-backed RAM Memory is provided. This will maintain the RAM Memory for approximately 15 days from time of power loss (see chart provided in this manual).

NOTE: If battery is not used, a jumper is provided to prevent constant illumination of this LED.

MEMOREY MODULES

NOTE: Tri-Clover provides and installs a UVPROM Memory Module. This will provide maximum protection against user program loss or program alteration due to battery backup drain, processor malfunction, or excessive noise.

The UVPROM Memory Module plugs into the SLC 500 controller. With a memory module, you can:

- Save the contents of the processor RAM memory for storage purposes.
- Load the contents of the UVPROM into the processor RAM.
- The UVPROM memory module is used when program security is required because the program in the UVPROM cannot be altered when it is installed in the controller.

The UVPORM memory is programmed at Tri-Clover to download the contents of the UVPORM Memory Module at power up. Additionally, once downloading takes place, the RAM memory will match the UVPROM memory. The status table bits are set to tell the processor to detect the presence of a memory module in order to enter "RUN" mode. If UVPROM Memory Module is removed, processor will fault when power is reapplied.

IMPORTANT: The UVPROM (Memory Compartment) and COMMUNICATION PORT, located on the face of the PLC, can be sealed by the Regulatory Official. This will prevent unauthorized entry and protect the integrity of the original memory. With the Communication Port sealed, a Programming terminal cannot be connected to the processor.

INPUT AND OUTPUT STATUS INDICATORS

Red LED indicators are identified with address numbers that correspond to the numbers on the inside of the hinged covers for easy verification. The 18 Inputs are 0-17, wired to the bottom of the controller. The 12 Outputs are 0-11 and wired to the top of the controller.

The addresses and their corresponding Inputs and Outputs are as listed below:

Input #	Name & Function When LED "ON"
0	Switch in "PRODUCT" position.
1	Switch in "INSPECT" position.
2	Switch in "CLEAN" (CIP) position.
3	Manual divert Pushbotton. Diverts Flo-Diversion valves when valves are in forward flow and switch is in "PRODUCT" position.
4	Divert Flow Light (Microswitches) – Input from divert and leak detect valves to indicate both valves are in divert flow (DE-ENERGIZED). Panel mounted red light is also "ON" whenever this input is "ON".
5	Divert Flow STLR – Input from valve microswitches and STLR to indicate divert flow during sub-legal temperatures. Used as timing pump interlock.
6	Forward Flow Legal Temperature STLR – Input from STLR indicating legal temperature has been reached.
7	Forward Flow Light (Microswitches) – Input from divert valve microswitch to indicate valve is forward flow (energized). Panel mounted green light is also "ON" whenever this input is "ON".
8	Timing Pump Running – Input from timing pump relay to signal the controller that the pump is "ON". Used as interlock to booster pump.
9	Divert Valve CIP – Optional input from customer's control to pulse divert valve whenever input is "ON" and switch is in "CLEAN" but only after ten minute time delay.
10	Leak Detect Valve CIP – Optional input from customer's control to pulse leak detect valve whenever input is "ON" and switch is in "CLEAN" but only after ten minutes time delay.
11	Booster Pump CIP – Optional input from customer's control to run booster pump whenever input is "ON" and switch is in "CLEAN". Ten minute CIP time delay is not required.
12	Eight minute CIP cycle – Optional input to increase valve pulse cycle from four minutes to eight minutes. Internal jumper to terminal #3 may be used.
13	Not used at this time.
14	Not used at this time.
15	Differential pressure switch. Input to signal the controller that the raw and pasteurized pressure differential is above legal requirements.
16	Meter System Hi-Flow – Input to signal the controller when high flow alarm from the recording flow controller is activated. This input is "OFF" when in alarm. When using conventional positive timing pump, jumper this input to terminal #3.
17	Not used at this time.

Output #	Name & Function
0	Timing Pump (or Homogenizer used as Timing Pump) – Output enables pump start/stop circuit. Output is interlocked to valve microswitches during sub-legal temperatures to prevent forwarding of unsafe product. Output is disabled during CIP operations.
1	Homogenizer (when not used as timing pump) – Output enables homogenizer start/stop circuit. Output is interlocked to valve Microswitches during sub-legal temperatures to prevent forwarding of unsafe product. Output is enabled during CIP operations.
2	CIP Pump – Output to enable CIP pump start/stop during CIP operations.
3	Booster Pump – Output to enable booster pump on/off circuit. Interlocked to inputs #11 & #15.
4	Divert Valve Solenoid – Output to divert valve solenoid. Output power is either 120 vac when solenoid is mounted inside panel or 24 vac when solenoid is mounted on valve.
5	Leak Detect Valve Solenoid – Output to leak detect solenoid. Output power is either 120 vac when solenoid is mounted inside panel or 24 vac when solenoid is mounted on valve.
6	Forward flow Signal – Optional output to signal customer's system when both divert valve and leak detect valve are in forward flow or energized position.
7	Ten minute CIP delay timer – Optional output to signal customer's system that the ten minute CIP delay timer for valve pulsing is time out.
8	Flo-Diversion Valve Fault – Optional output signal to customer's system indicating a mismatch between input pairs 4, 5 and 6, 7. Output will flash when mismatch is detected.
NOTE:	When using magnetic flow meter timing, system output will flash when flow alarm is activated during legal temperature periods.
9	Timing Pump Interlock – Optional output that follows same logic as output #0. Signal may be used to interlock additional flow promoting devices such as booster pumps.
10	Timing Pump Running – Optional output to customer's control system, indicating timing pump is running. This output is based on input #8 timing pump contact from relay in motor starter.
11	Not used at this time.
NOTE:	Optional Relay Outputs #6 through #10 are powered by customer supplied voltage to Terminal #33.

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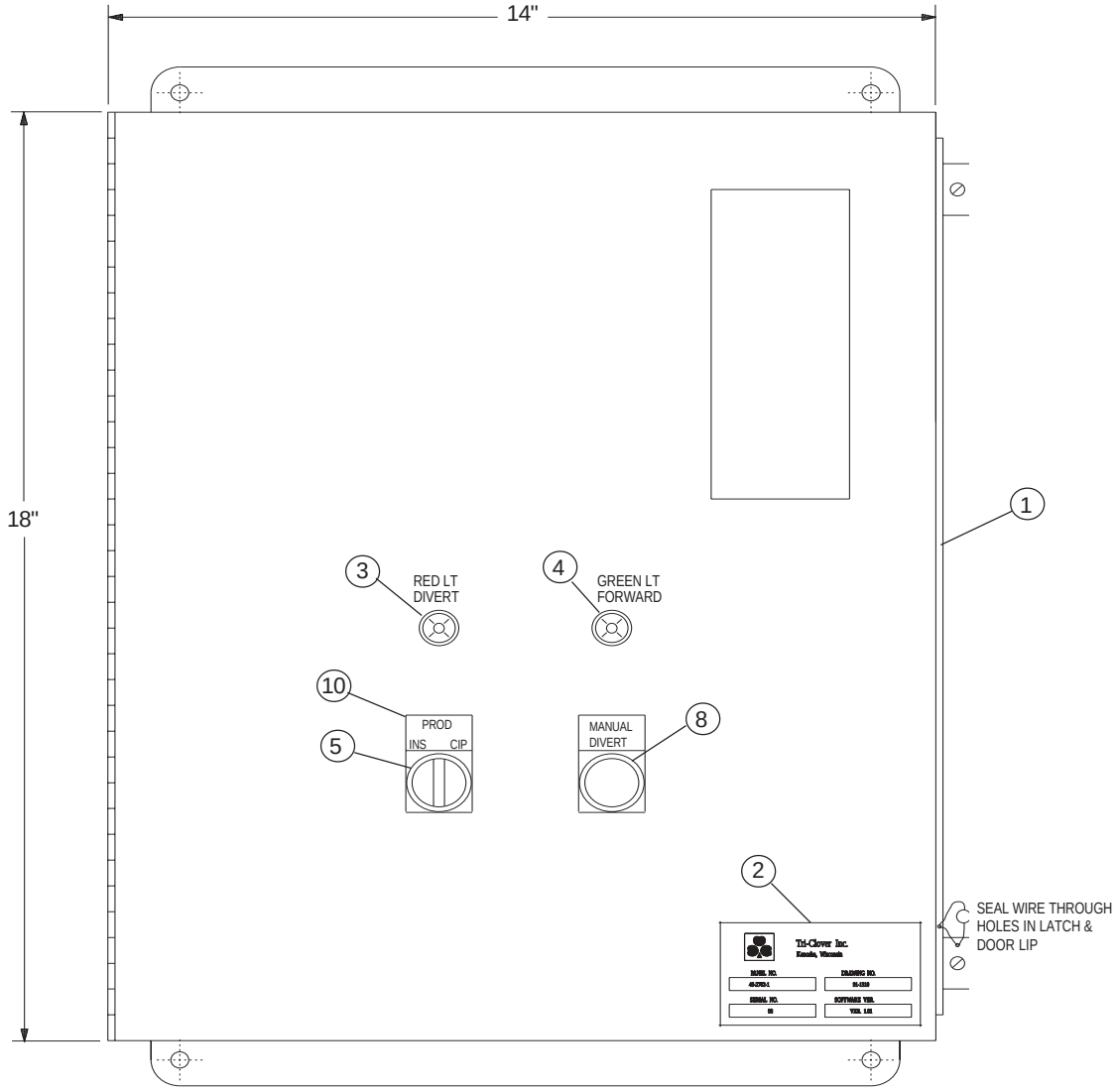
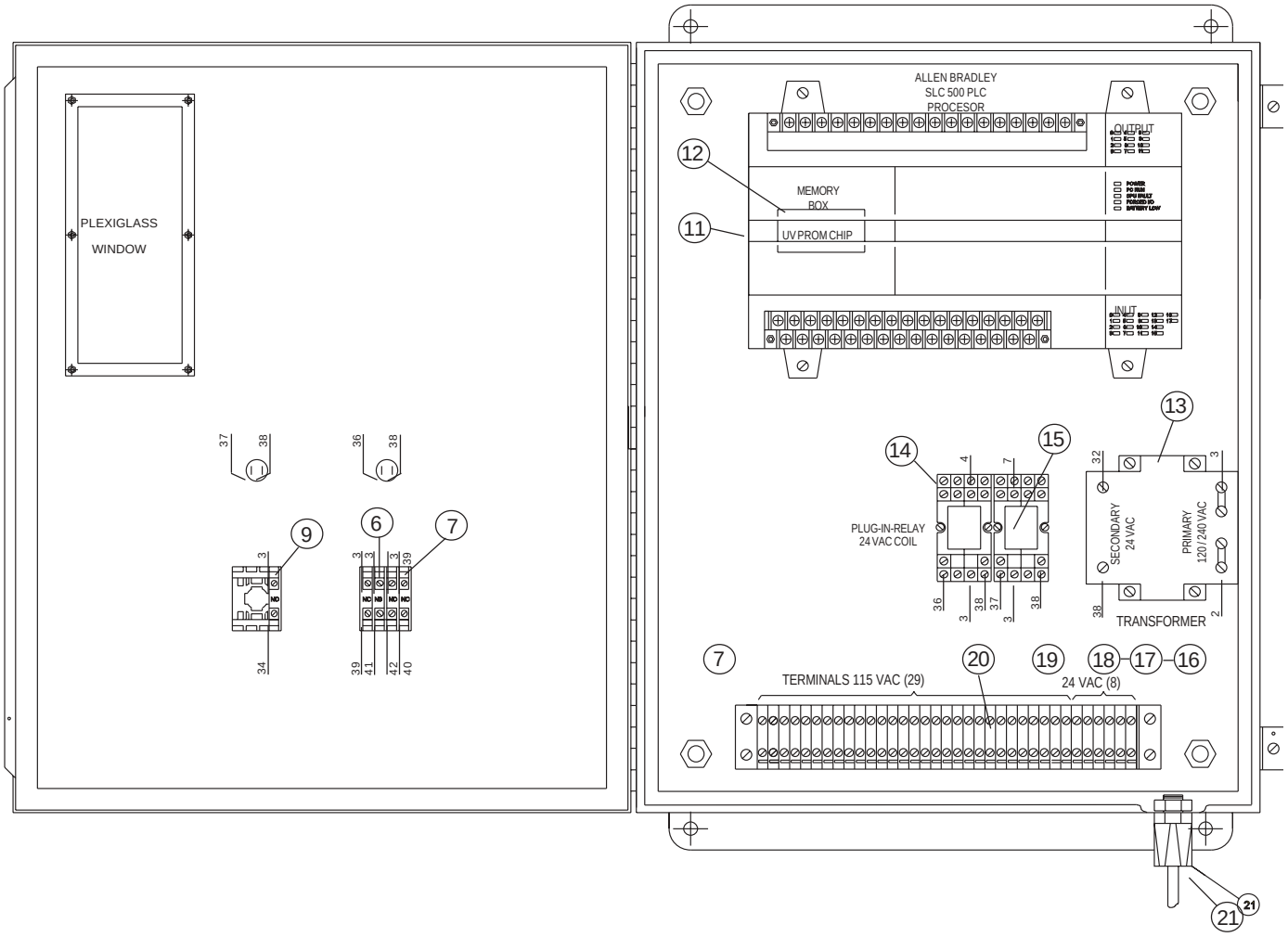
FLO-DIVERSION PANEL #48-2762-1 WITHOUT SOLENOIDS

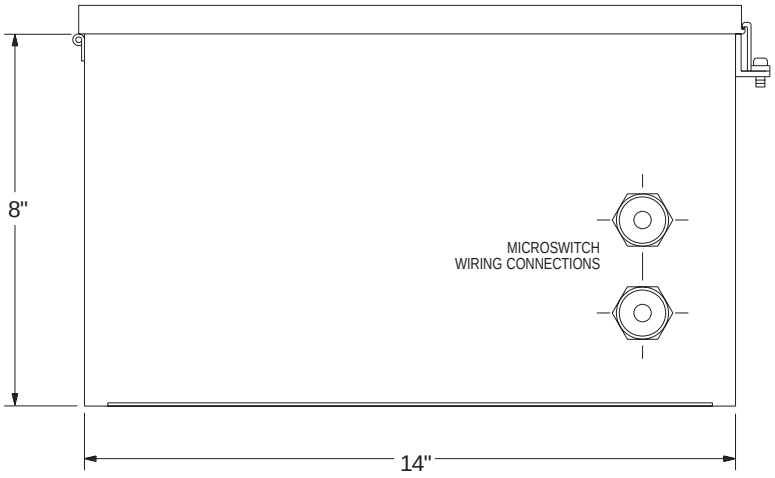


Key #	Description	Part No.	Qty.
1	S/S Enclosure w/ Window (18"H x 14" W x 8" DP)	44-273	1
2	Panel Nameplate (Door)	38-300	1
3	Indicating Light (Red)	EL-28460-0028	1
4	Indicating Light (Green)	EL-28460-0029	1
5	3-Position Knob Operator w/o Contact Blocks	EL-79730-0068	1
6	2 N.O. Contact Blocks w/ Latch	EL-79170-0035	1
7	1 N.C. Contact Block w/o Latch	EL-79170-0036	2
8	Pushbutton (Green) w/o Contact Block	EL-79610-0095	1
9	1 N.O. Contact Block w/ Latch	EL-79170-0037	1
10	Pushbutton Nameplate	38-298	2

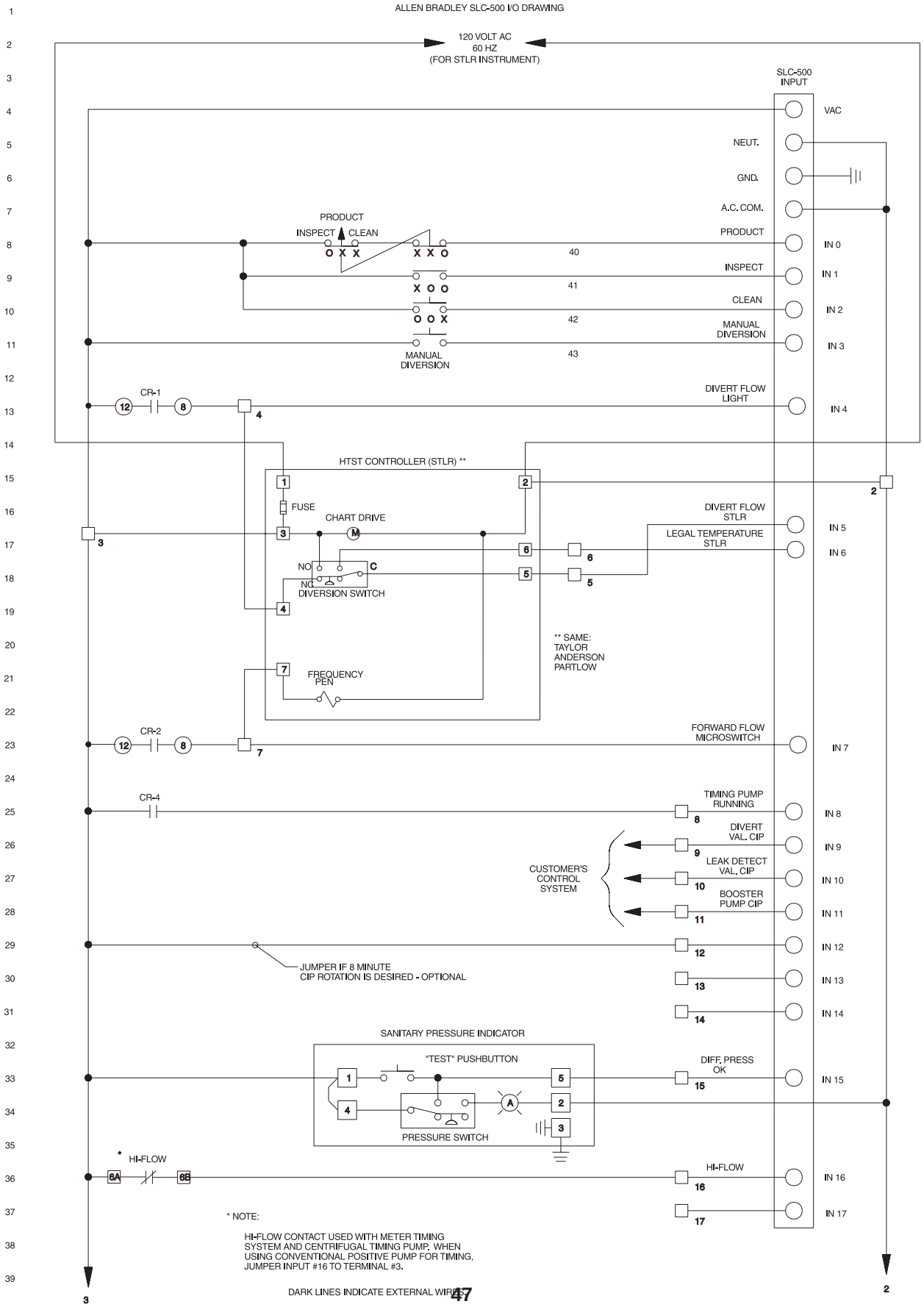
Key #	Description	Part No.	Qty.
11	Allen Bradley SLC-500 (1747-L30A)	EL-22590-0019	1
12	Allen Bradley UV PROM Chip	EL-11600-0077	1
13	Transformer 120 / 240 VAC Primary / 24 VAC Secondary	EL-90940-0039	1
14	Plug-in-Relay Socket	EL-60010-0013	2
15	Plug-in-Relay (4PDT) 24 VAC Coil	EL-60340-0038	2
16	Terminal End Barrier Plate	EL-19870-0102	1
17	Terminal End Anchor	EL-19870-0103	2
18	Terminal Mounting Rail	EL-19870-0104	1
19	Terminal 24 VAC (Blue)	EL-19870-0101	8
20	Terminal 110 / 220 VAC (White)	EL-19870-0100	29
21	Hubbell Cord Grip	EL-40200-0002	2

ALLEN-BRADLEY SLC 500 PLC

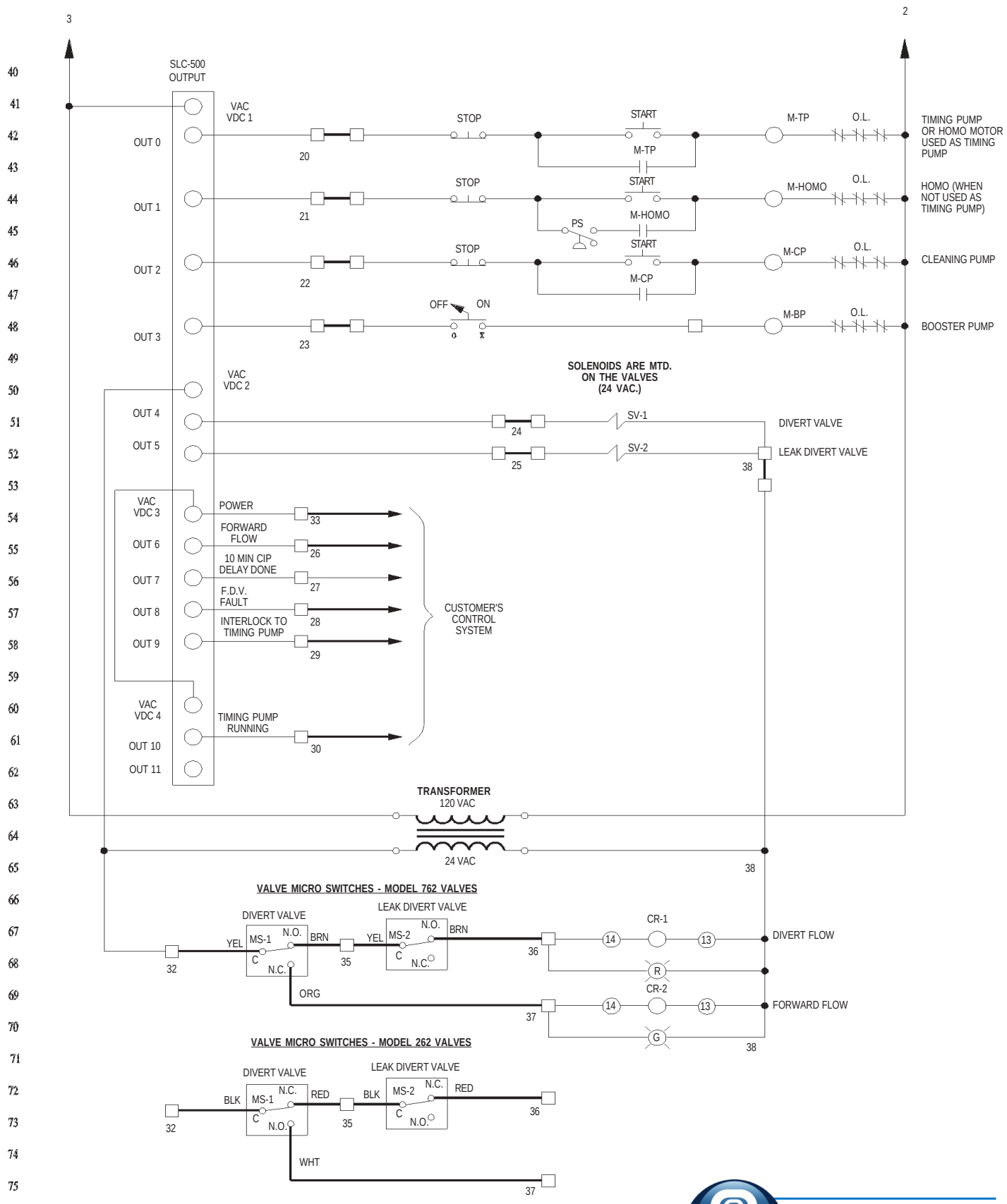




WIRING DIAGRAM FOR FLO-DIVERSION PANEL #48-2762-1



ALLEN-BRADLEY SLC 500 PLC



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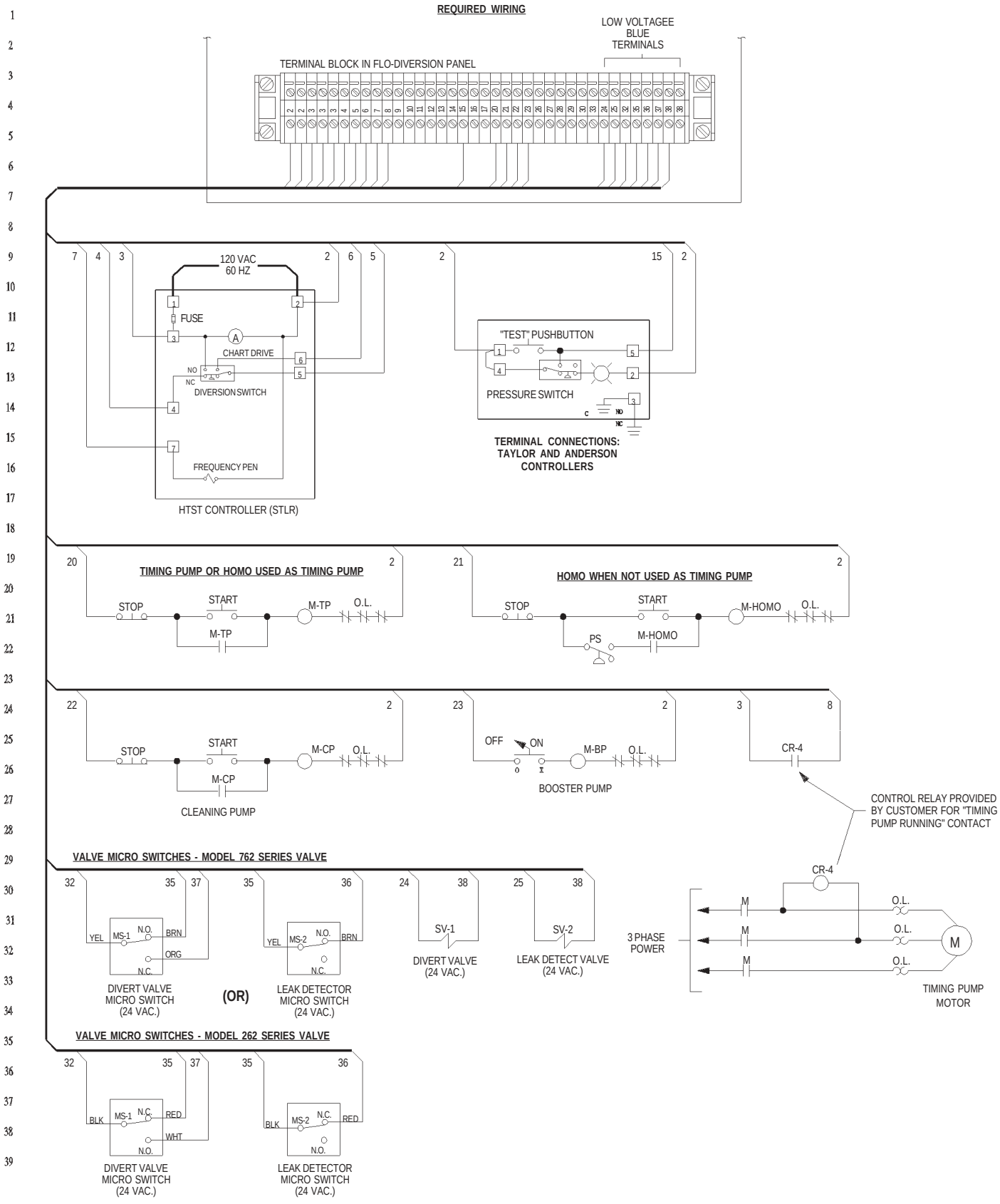
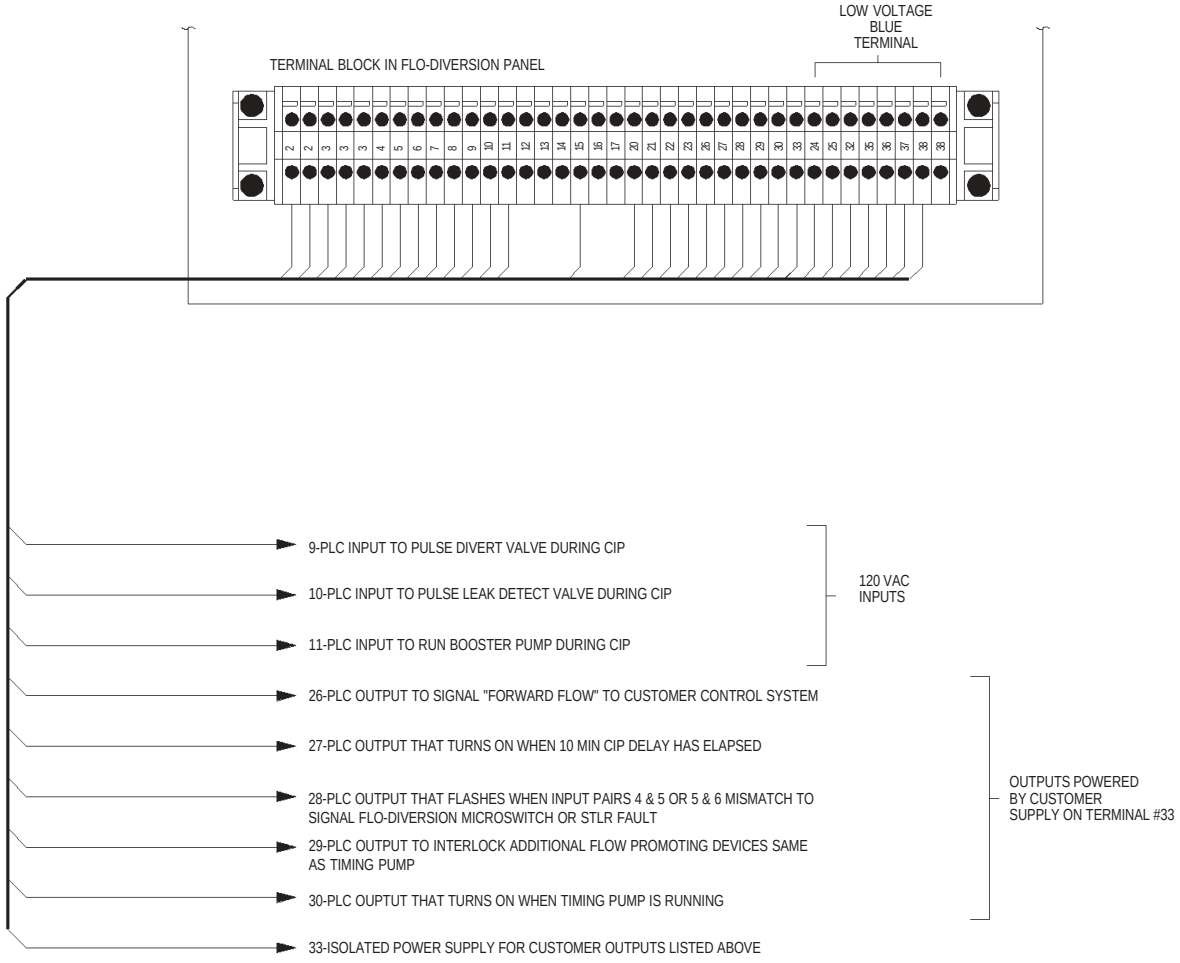
ALLEN-BRADLEY SLC 500 PLC

EXTERNAL WIRING DIAGRAM FOR FLO-DIVERSION PANEL 48-2762-1



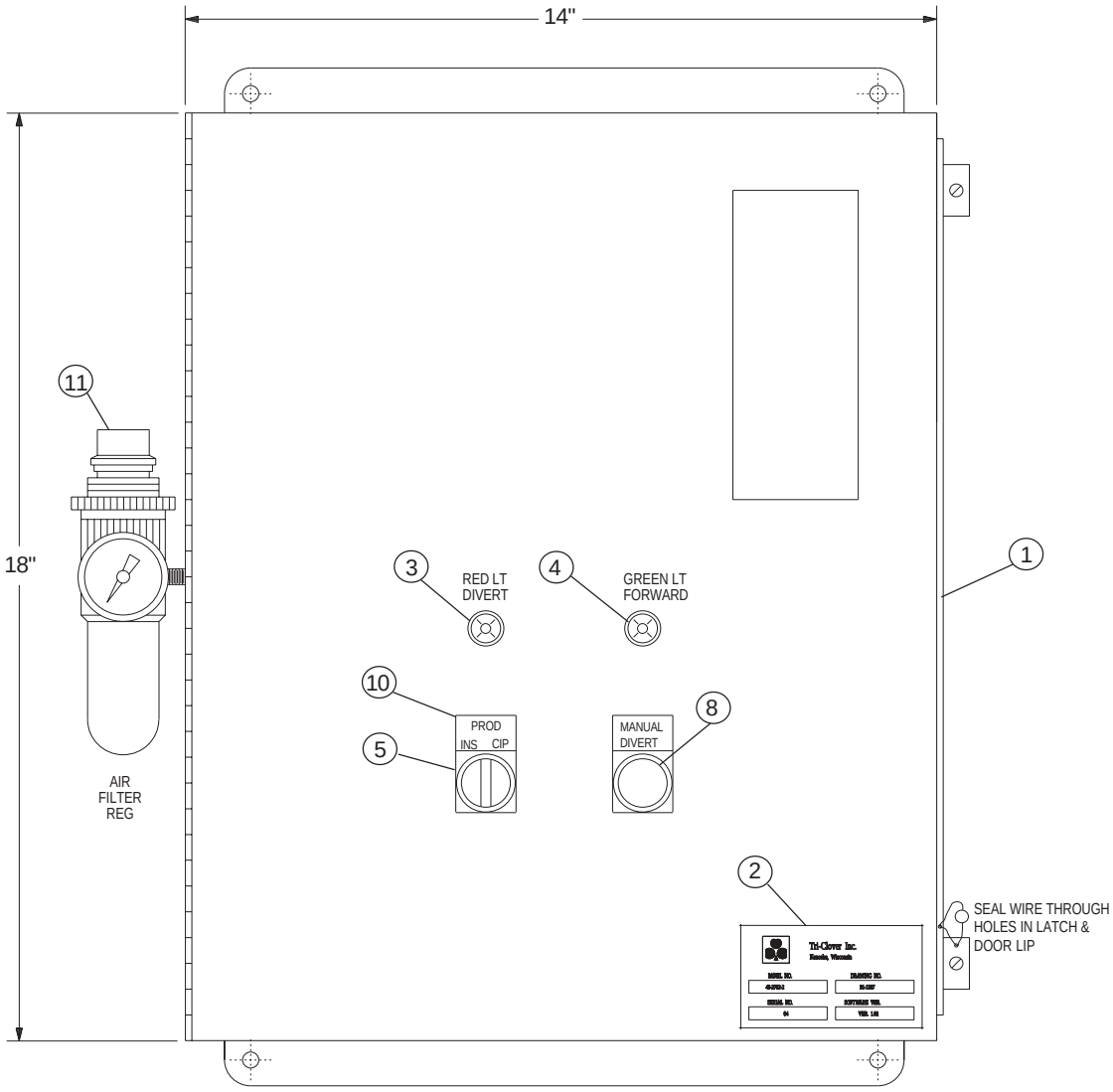
ALLEN-BRADLEY SLC 500 PLC

OPTIONAL WIRING
(PLUS REQUIRED WIRING)


LOW VOLTAGE
BLUE
TERMINAL
TERMINAL BLOCK IN FLO-DIVERSION PANEL
9-PLC INPUT TO PULSE DIVERT VALVE DURING CIP
10-PLC INPUT TO PULSE LEAK DETECT VALVE DURING CIP
11-PLC INPUT TO RUN BOOSTER PUMP DURING CIP
120 VAC
INPUTS
26-PLC OUTPUT TO SIGNAL "FORWARD FLOW" TO CUSTOMER CONTROL SYSTEM
27-PLC OUTPUT THAT TURNS ON WHEN 10 MIN CIP DELAY HAS ELAPSED
28-PLC OUTPUT THAT FLASHES WHEN INPUT PAIRS 4 & 5 OR 5 & 6 MISMATCH TO SIGNAL FLO-DIVERSION MICROSWITCH OR STLR FAULT
29-PLC OUTPUT TO INTERLOCK ADDITIONAL FLOW PROMOTING DEVICES SAME AS TIMING PUMP
30-PLC OUPTUT THAT TURNS ON WHEN TIMING PUMP IS RUNNING
OUTPUTS POWERED
BY CUSTOMER
SUPPLY ON TERMINAL #33
33-ISOLATED POWER SUPPLY FOR CUSTOMER OUTPUTS LISTED ABOVE

ALLEN-BRADLEY SLC 500 PLC

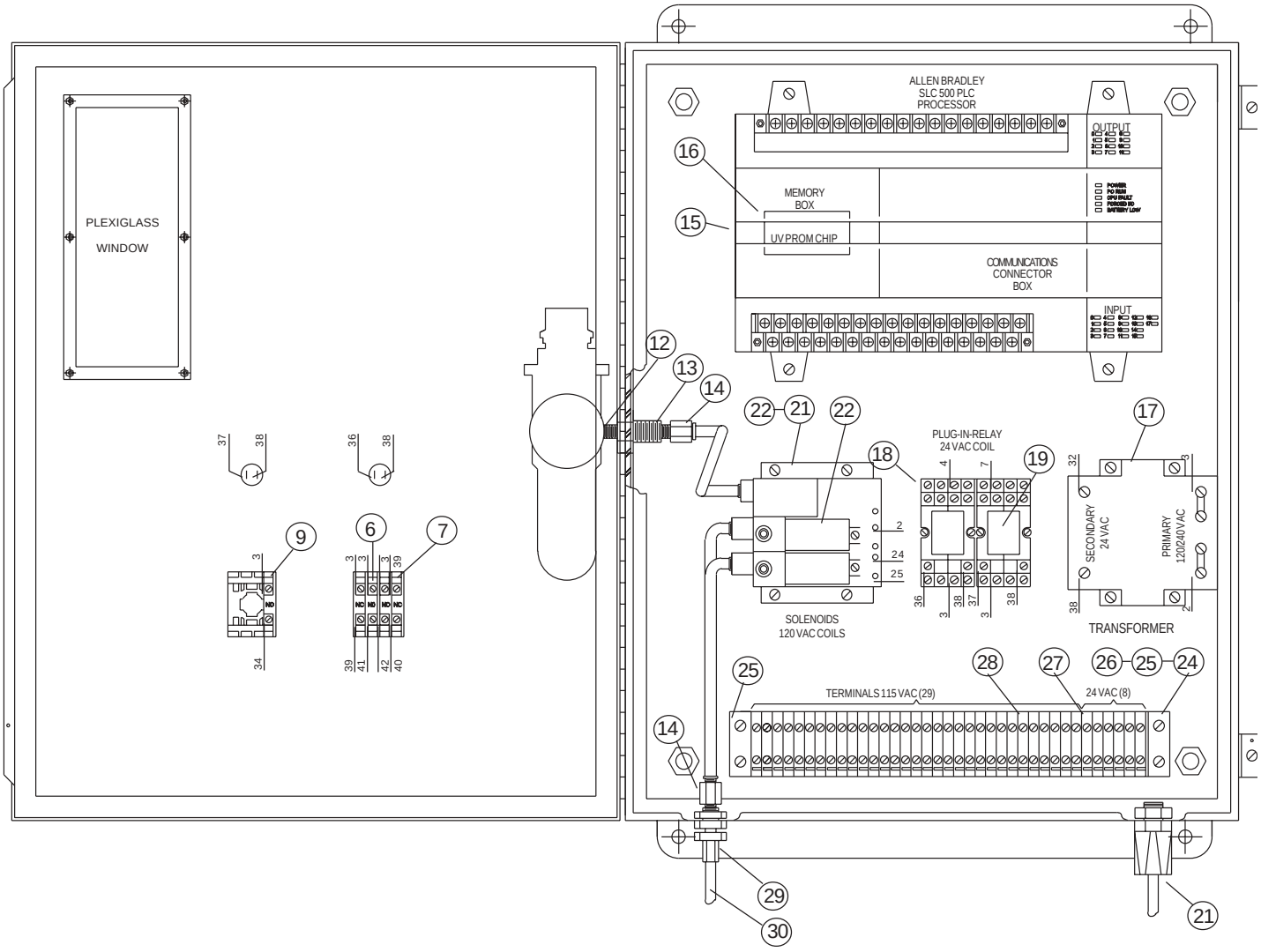
FLO-DIVERSION PANEL #48-2762-2 WITH SOLENOIDS

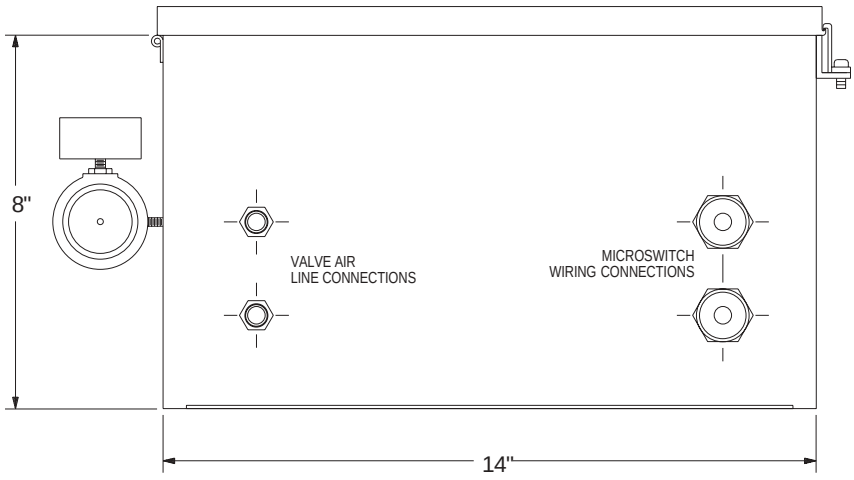


Key #	Description	Part No.	Qty.
1	S/S Enclosure w/ Window (18"H x 14" W x 8" DP)	44-273	1
2	Panel Nameplate (Door)	38-300	1
3	Indicating Light (Red)	EL-28460-0028	1
4	Indicating Light (Green)	EL-28460-0029	1
5	3-Position Knob Operator w/o Contact Blocks	EL-79730-0068	1
6	2 N.O. Contact Blocks w/ Latch	EL-79170-0035	1
7	1 N.C. Contact Block w/o Latch	EL-79170-0036	2
8	Pushbutton (Green) w/o Contact Block	EL-79610-0095	1
9	1 N.O. Contact Block w/ Latch	EL-79170-0037	1
10	Pushbutton Nameplate	38-298	2
11	Air Regulator	33-68-1/8	1
12	1/8 NPT Fitting	42-15-33	1
13	Bulkhead Fitting	42-15-62	1
14	Straight Fitting (1/8 NPT x 1/4 PL)	42-76-5	3
15	Allen Bradley SLC-500 (1747-L30A)	EL-22590-0019	1
16	Allen Bradley UV PROM Chip	EL-11600-0077	1

Key #	Description	Part No.	Qty.
17	Transformer 120 / 240 VAC Primary / 24 VAC Secondary	EL-90940-0039	1
18	Plug-in-Relay Socket	EL-60010-0013	2
19	Plug-in-Relay (4PDT) 24 VAC Coil	EL-60340-0038	2
20	Telemecanique Solenoid Din Mounting Track	EL-60010-0014	1
21	Telemecanique Head/Tail Module Seat	33-192	1
22	Telemecanique Solenoid Valve (N.C. - 120 VAC)	33-188 (w/ coil)	2
23	1/4" - Poly Flo Tubing	41-6	2-ft.
24	Terminal End Barrier Plate	EL-19870-0102	1
25	Terminal End Anchor	EL-19870-0103	2
26	Terminal Mounting Rail	EL-19870-0104	1
27	Terminal 24 VAC (Blue)	EL-19870-0101	6
28	Terminal 110 / 220 VAC (White)	EL-19870-0100	31
29	Hose Connector	37-27	2
30	Black Hose (10 ft. long)	41-9-BLACK	20-ft.
31	Hubbell Cord Grip	EL-40200-0002	2

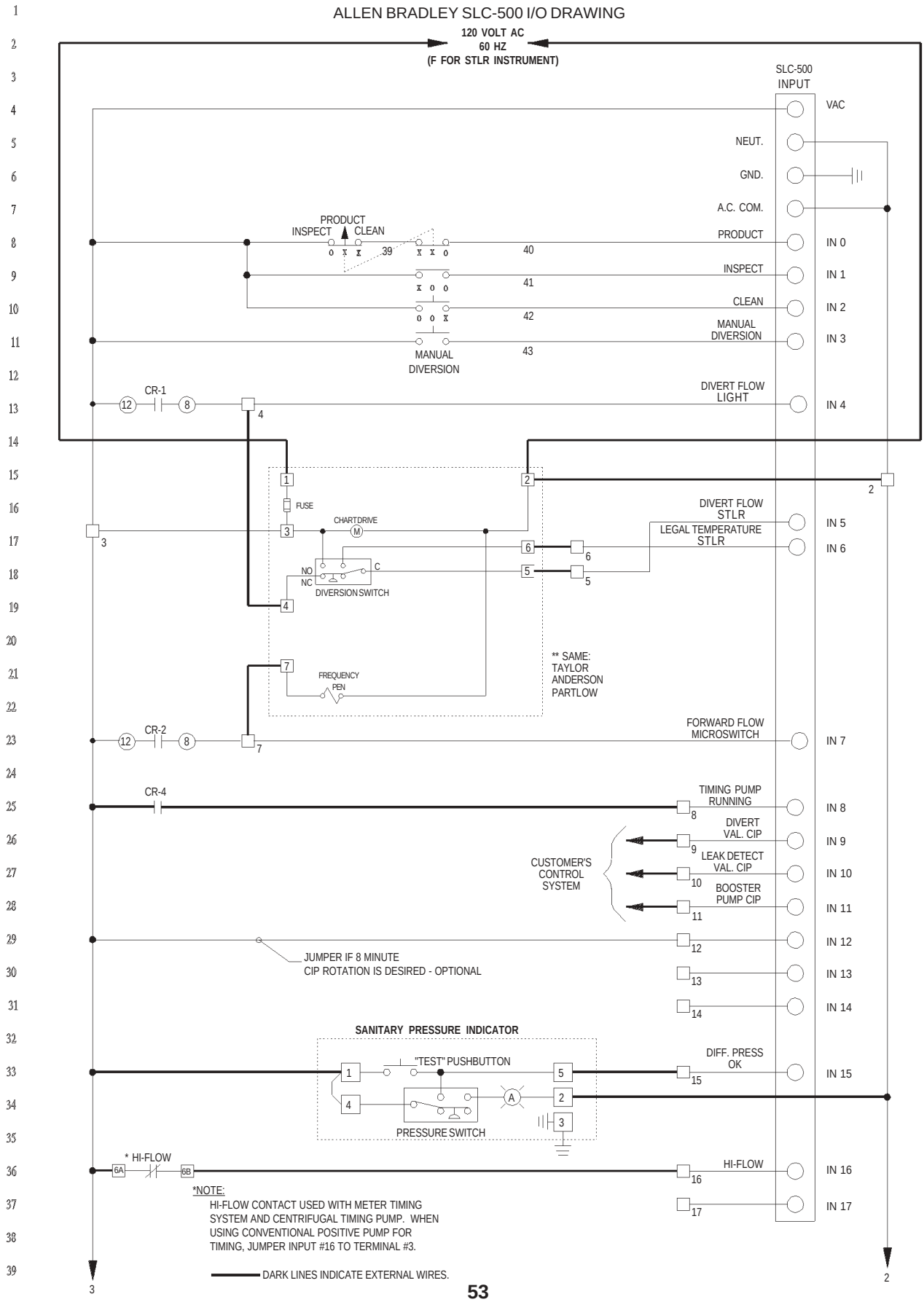
ALLEN-BRADLEY SLC 500 PLC



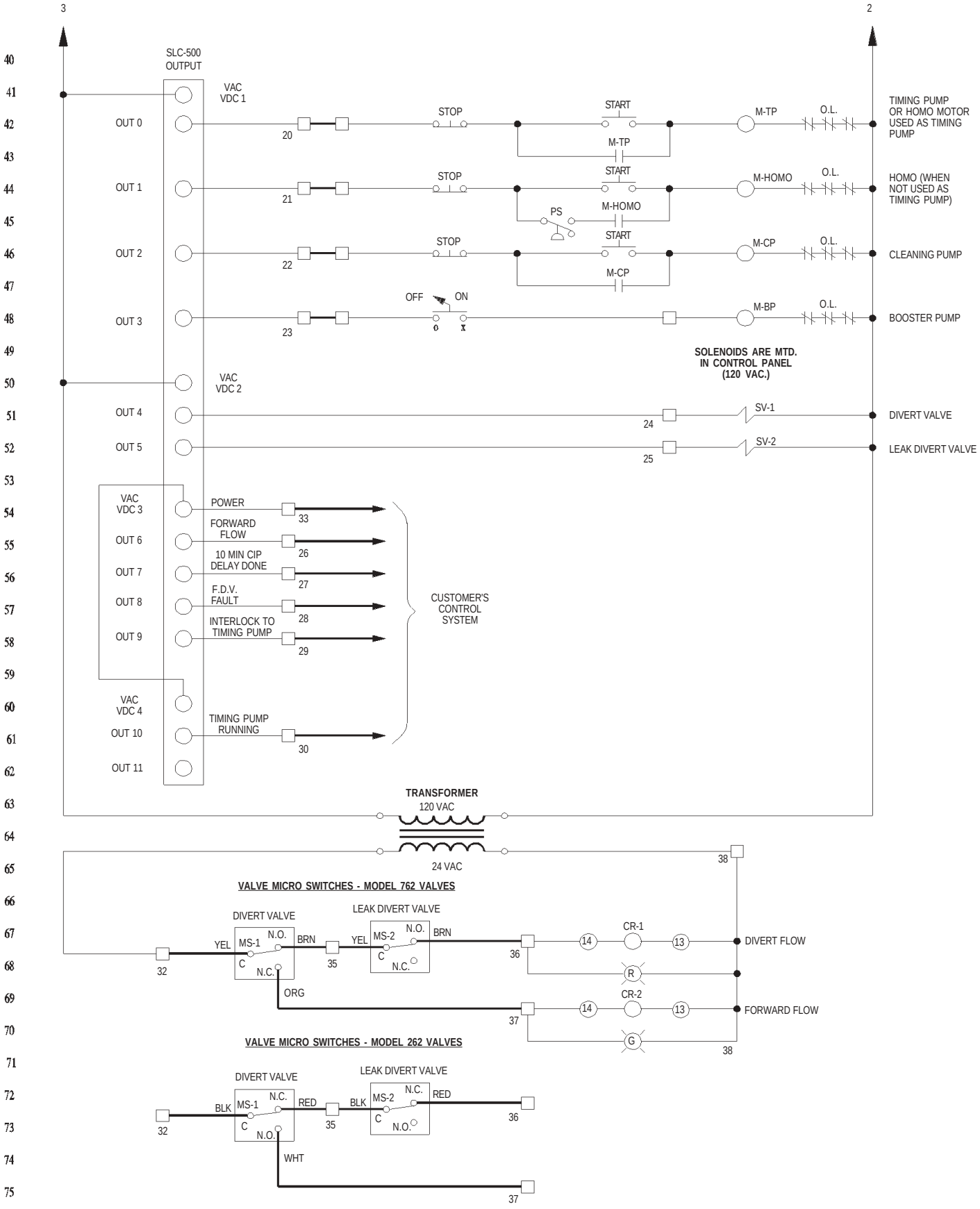


ALLEN-BRADLEY SLC 500 PLC

WIRING DIAGRAM FOR FLO-DIVERSION PANEL #48-2762-2

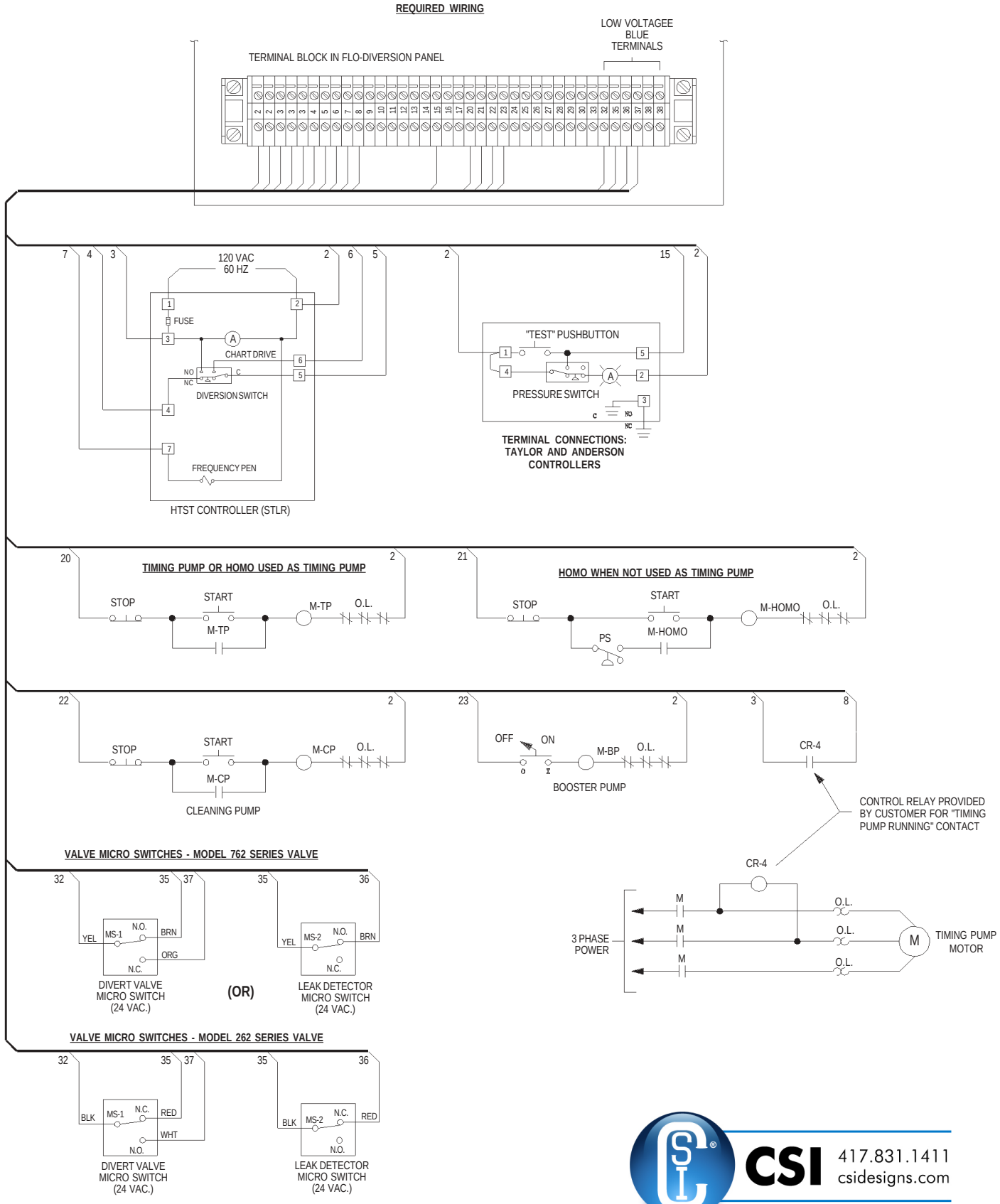


ALLEN-BRADLEY SLC 500 PLC



ALLEN-BRADLEY SLC 500 PLC

EXTERNAL WIRING DIAGRAM FOR FLO-DIVERSION PANEL #48-2762-2



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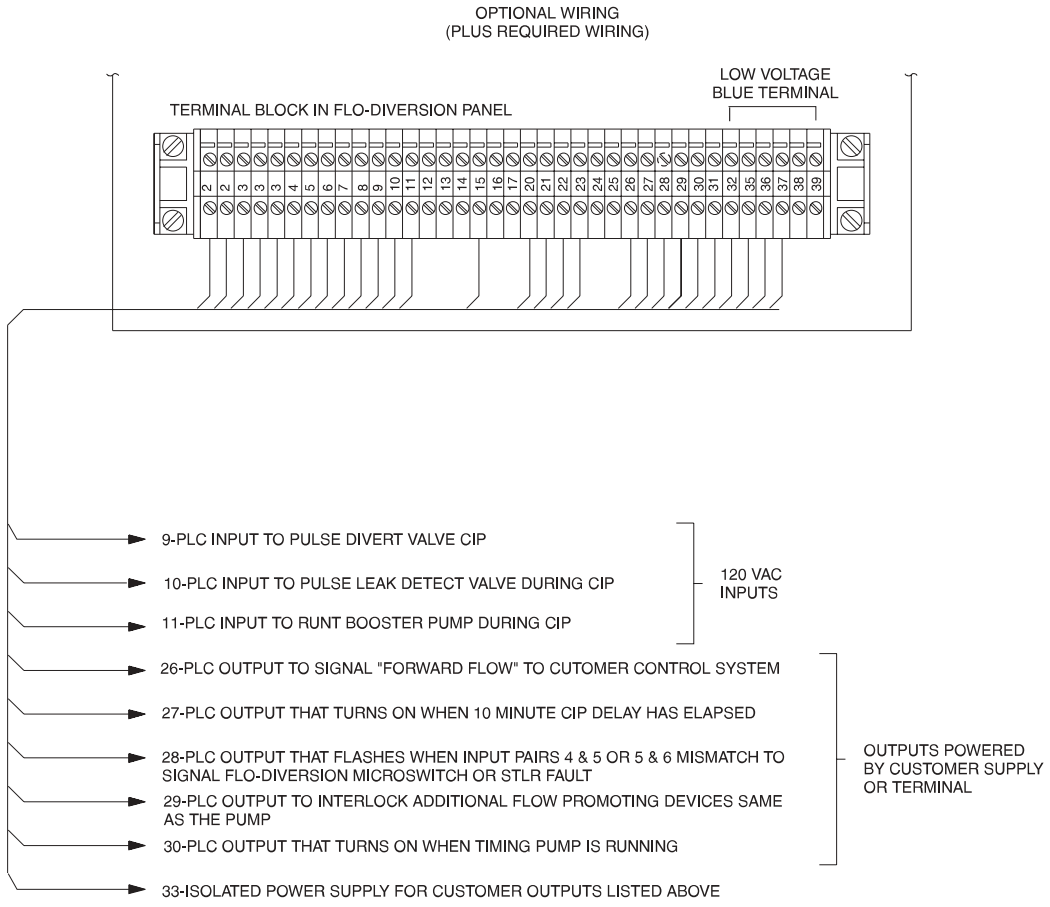
OPTIONAL WIRING
(PLUS REQUIRED WIRING)
LOW VOLTAGE
BLUE TERMINAL
TERMINAL BLOCK IN FLO-DIVERSION PANEL
9-PLC INPUT TO PULSE DIVERT VALVE CIP
10-PLC INPUT TO PULSE LEAK DETECT VALVE DURING CIP
11-PLC INPUT TO RUNT BOOSTER PUMP DURING CIP
120 VAC
INPUTS
26-PLC OUTPUT TO SIGNAL "FORWARD FLOW" TO CUTOMER CONTROL SYSTEM
27-PLC OUTPUT THAT TURNS ON WHEN 10 MINUTE CIP DELAY HAS ELAPSED
28-PLC OUTPUT THAT FLASHES WHEN INPUT PAIRS 4 & 5 OR 5 & 6 MISMATCH TO SIGNAL FLO-DIVERSION MICROSWITCH OR STLR FAULT
29-PLC OUTPUT TO INTERLOCK ADDITIONAL FLOW PROMOTING DEVICES SAME AS THE PUMP
30-PLC OUTPUT THAT TURNS ON WHEN TIMING PUMP IS RUNNING
OUTPUTS POWERED
BY CUSTOMER SUPPLY
OR TERMINAL
33-ISOLATED POWER SUPPLY FOR CUSTOMER OUTPUTS LISTED ABOVE

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